# THE GAS JOURNAL

## JULY 27, 1932

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## A Glance at the Contents—

**Gas at Dartford Industrial Exhibition.**

The Gas Industry was well represented at the recent Dartford Industral Development Exhibition in a comprehensive exhibit staged by the South Suburban Gas Company. [p. 197.]

**South Suburban Co-Partnership Festival.**

Dr. C. Carpenter, Chairman of the Company, addressed the Co-partners of the South Suburban Gas Company at their Co-Partnership Festival held at the Crystal Palace last Saturday. [p. 204.]

**International Congress on Commercial Education.**

Sir David Milne-Watson is the President of the International Congress on Commercial Education which opened in London last Monday. His Presidential Address appears on p. 194.

**Gas Distribution in Sydney.**

The system of high-pressure gas distribution in Sydney by the Australian Gas Light Company is described by Mr. T. F. Waugh (the Company's Distribution Engineer) in a paper read before the Engineer Surveyors' Association (Australasia), Inc. [p. 202.]

**Corporation Gas Undertaking Results.**

Further results of Corporation Gas Undertakings for the year ended March 31 last are published. [p. 205.]

**A New Coin Collectors' Truck.**

A novel form of coin collectors' truck, designed by Mr. C. F. W. Rendle, Engineer of the Redditch Gas Company, is described and illustrated. [p. 201.]

**Watford Company's Amalgamation.**

An Extraordinary General Meeting of the Watford and St. Albans Gas Company was held on July 19 at the Company's chief showrooms, 149, The Parade, for the purpose of approving the agreement for the transfer of the Welwyn and Hatfield Gas Company, Ltd., to the Watford and St. Albans Gas Company. [p. 204.]

**The Storage of Coal.**

How to store coal with the minimum loss and expense is a problem which confronts every gas engineer to a greater or less extent because of his obligation to maintain an uninterrupted supply of gas. A contributor to-day deals with the theory, practice, and economics of this interesting question. [p. 199.]

## Forthcoming Engagements

Aug. 16 and 17.—IRISH ASSOCIATION.—Meeting in Dublin.
Sept. 1.—ASSOCIATION OF STATUTORY METER INSPECTORS.—Annual Meeting in Edinburgh.
Sept. 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Ayr.
Sept. 13.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board. There will be no meeting of the Board or of the Central Committee of the Federation of Gas Employers during August.
Sept. 22.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Meeting at Porthcawl.
Sept. 26 to 28.—B.C.G.A.—Annual Conference at Leeds.

### 1932 "JOURNAL" Directory.

Page 80. CASTLE DOUGLAS. D. M'Rae appointed Engineer and Manager vice R. Croll, retired.

Page 86. INVERURIE. D. M'Rae appointed to Castle Douglas.

# EDITORIAL NOTES

## *Storage of Coal*

THERE are many valuable hints on the best manner in which to store coal to minimize deterioration and avoid spontaneous combustion in an article in to-day's "JOURNAL." Coal is such a complex substance that the problem of its storage automatically becomes complicated; but our contributor's careful review of the theory and practice, as well as the economics, of the subject should prove useful in clearing up certain anomalies. From the Gas Industry's point of view deterioration of the coal by oxidation is the more important phase of the question, for, generally speaking, even under favourable conditions weathering results in reduced gas yield and reduced coking power, and with some coals deterioration may occur to a disastrous extent. Hence a knowledge of which coals to store and which not to store, and the conditions under which the changes that take place are least deleterious to the working results of a gas undertaking is not only desirable, but necessary. In the foregoing we have employed the qualifying clause "generally speaking" because certain coals are found to improve by storage and to give superior results after several months' exposure. When a list of these coals is available they will no doubt be in considerable demand for storage purposes.

As far as is known, deterioration of coal during storage is wholly caused by oxidation; and our contributor emphasizes the effect of size of coal on the rate of oxidation. And in this connection he suggests that attention be given to the storage of slack under water. Such storage would have the dual advantage that the cheapest variety of coal could be stored and that the coal would not deteriorate in any way. "There is," he says, "much to recommend this method, particularly where a gas-works is situated in a district, such as Derbyshire, where the nearest coal is easily oxidized. The extra capital expense might well be repaid by the decreased cost of stored coal over many years." It is explained that, of the banded constituents of coal, vitrain has the greatest tendency to spontaneous combustion, clarain has the next greatest, while durain and fusain have considerably less tendency. From the practical man's viewpoint the significance of this is that bright coals have a greater tendency to spontaneous combustion than dull coals; but this cannot be taken as a complete generalization, since the bright coal from a certain seam may have less tendency to spontaneous combustion than the dull coal from another seam. All work on coal is complicated by the dissimilarity which exists between all coals, even when from apparently similar geological strata.

The influence of physical structure on spontaneous combustion is dealt with at some length by the author. If possible, fines should not be stored; and if fines have to be stored, then access of oxygen to them should be avoided. The method of handling the coal, it is pointed out, is of importance, since, if the coal is stacked from any height, fines are likely to be produced. "Even more important than the production of fines *per se* is the avoidance of segregation, since, if the fines are localized, the surface area may be increased to a dangerous extent. Coal for stocking should preferably be in large pieces, but if some fines are inevitable, they should be uniformly mixed with the larger coal. The method of handling must be so chosen as to comply with these principles." In regard to ventilation of the coal pile, on which matter there is much divergence of opinion, the author suggests that, if the coal consists of lump with little or no dust, provision of ventilating channels is wise, but if the coal is dusty these channels are a source of danger. Lumps, nuts, and fines should be well mixed before stacking, and coal from different seams should not be mixed in the stack heap. Stacking in cone formation from an overhead conveyor is bad practice. Valuable suggestions on the method of ascertaining the temperature of the coal pile and of dealing with fire, should this occur, are also contained in the article.

## *High-Pressure Distribution in Sydney*

ON later pages is an outline of the salient features of the distribution practice of the Australian Gas Light Company—in point of output the seventh largest gas undertaking in the British Empire, with an annual sale of 6608 million c.ft.—by the Distribution Engineer, Mr. T. F. Waugh. The Company serves a large area (a matter of 250 square miles), and only one undertaking in the Empire has a greater mileage of mains. In spite of the scattered nature of the district, however, the Company is in the proud position of supplying the cheapest gas in Australia. At June 30, 1931, the number of consumers was practically a quarter of a million, the main mileage 2018, and the mileage of services 2641; and the consumption per consumer, 28,197 c.ft., is a praiseworthy feature. An account of the development of the undertaking since its incorporation in 1837, when the population of Sydney was only 25,000, is given by the author, who explains that the mains are now all high pressure. Generally consumers are not supplied direct from these mains, almost every street in the area having its low-pressure main. These low-pressure mains are kept at a nearly constant pressure by automatic governors, of which there are some 200, set to give various pressures according to the altitude of the area they supply, so that the whole district is kept balanced in regard to gas pressure. Those consumers supplied direct from the main have governors installed, of course. The net result of the entire system is uniformity of pressure at the consumers' burners at all times—a *sine quâ non* of efficient gas service.

The scheme has been justified by the results. Gas manufacture is centralized, and the gas is sent out at high pressure to district holder stations situated at a radius of 6 miles from the gas-making plant. Boosting plant is installed at these stations, to relieve the work of compression, and hence promote over-all economy, at the producing works at Mortlake. The boosting plant at two of the outlying stations is unique. At one station (Alexandria) five crankless boosters of the Michell type, each of a capacity of 500,000 c.ft. a day against a pressure of 200 in. water gauge are installed; and a similar plant consisting of two machines is in use at another station (Canterbury). The author's details of the working of this boosting plant, the largest of its kind in the world, and particularly of the method employed for cooling the engines, are full of interest.

High store appears to be set by Mr. Waugh on the "gas unit." It seems, too, that in the near future in Sydney gas will actually be sold on the basis of a unit of 3412 B.Th.U., the equivalent to the Board of Trade electrical unit. "A direct comparison, on the basis of cost, will therefore be possible between gas and electricity." The present costs of this "gas unit" in Sydney are 0·409d. for domestic supply and 0·328d. (average) for industrial purposes. The minimum charge for electricity for continuous use is ½d. per unit, so that for other than special purposes the gas unit, allowing for the different efficiencies of utilization of gas and electricity, will show a good margin of economy. It will be interesting to see, however, how far selling gas on the basis of 3412 B.Th.U. will affect the total sales of the Australian Gas Light Company.

# Payment by Instalment

ADDRESSING the shareholders at the annual general meeting of the United Dominions Trust, Ltd., the Chairman (Mr. J. Gibson Jarvie) declared that, in spite of adverse conditions, there is still business to be done, if the community will only do it. The objective of his organization is to play its part in industry by providing medium and long-term credits which will enable our manufacturers and merchants and traders or tradesmen in general to extend credit to their customers, and so facilitate domestic or internal sales and increase employment. During the last year the Parent Company has financed the movement of merchandise to a value exceeding £6,000,000. This is an impressive figure, but Mr. Jarvie says that if those engaged in industry and commerce were thoroughly alive to the value of credit as an aid to salesmanship, and if the people of this country were aware of the inherent value and possibilities of their credit standing, this total might have been multiplied many times over.

" We have here in Great Britain," urged Mr. Jarvie, " one of the richest markets in the world, yet it is a market which has never been exploited to the fullest extent by home producers except in the case of a relatively few well-organized and well-managed businesses. Here, on the one hand, we have an immense capacity for production; on the other hand, we have this great market with innumerable wants still unsatisfied. Standing between the two we have the means of bringing the two together; and yet, comparatively speaking, it is left unused, with the result that unemployment continues at an abnormally high figure, and taxation in consequence is raised to a high figure which threatens to ruin industry altogether. . . . If British people to-day would only regain some of that confidence which has been lost, and anticipate some of their needs by placing their orders now; if our merchants and manufacturers would use the credit facilities at their disposal and sell on credit; if the people desirous of making purchases would take advantage of that credit, overnight there would be a change for the better in conditions. . . . It would quite unquestionably pay all of us if we were to anticipate our needs for a considerable time ahead. Hire-purchase, the much-abused instalment system, makes it possible for us to do that; and it applies to companies just as much as to individuals. It is scarcely possible that retail prices can ever be lower. Orders placed now will not only result in purchases at bargain prices, but more than that they will have the effect of assisting industrial revival."

These remarks bring us face to face with important questions of policy. As pointed out by Mr. Jarvie, the instalment system applies as much to undertakings as to individuals. Builders and contractors, through the Trust, can extend credit, and yet receive their cash at once; and those who have—as most of us must have done at times—experienced hotel accommodation out of parallel with the charges made, will have a thrill of pleasurable anticipation on learning that special financial facilities are offered for the renovation and improvement of property, including hotels. The extended credit, or instalment, system is approachable from various angles, according to the object to which it is applied, but there can be no doubt that it has an enormous field of usefulness. We find it in the Gas Industry in connection with hire-purchase terms for apparatus, and here it has been the means of placing among consumers vast quantities of modern and efficient appliances. This is a valuable function. When criticism of the instalment plan is heard, it is usually with reference to the temptation it may offer for the acquisition of luxuries which are really beyond the means of the purchaser.

It is a system which has come to stay, and retailers should definitely make up their minds regarding their attitude towards it. Or perhaps it would be better to say they should take definite steps to regulate the attitude of their salesmen towards it. If the business is not worth having, it should be left alone; if, on the other hand, it proves desirable, there should be no difference whatever—not even by so much as the flicker of an eyelid—on the part of an assistant in the treatment of a cash and an instalment customer, in establishments where a choice of methods of payment is offered. This is a point which friends of the long-credit plan should not overlook; for their success will be added to or subtracted from according to whether or not it is observed.

# Education and Examinations

ON other pages of this issue we publish the results of the 1932 Examinations of the Institution of Gas Engineers. With them the Secretary (Mr. J. R. W. Alexander) sends the following statement:

### MORE EXAMINEES.

The Comparative Statistical Schedule of the 1931 and 1932 Examination Results indicates an increase of 35 p.ct. in the number of candidates examined in 1932, as compared with the number of candidates examined in 1931. Thus, 310 candidates sat in 1931 and 416 in 1932, but these published figures may be increased to 349 and 471 respectively by adding the number of candidates who secured passes in the Examinations, but whose names are not published for the reasons given in the prefatory note to the published Results.

### QUALIFICATIONS FOR MEMBERSHIP OF INSTITUTION.

Possession of the Diploma in Gas Engineering is one of the qualifications necessary for admittance to the Institution as a Member, whilst the Higher Grade Certificate in Gas Engineering is required, *inter alia*, for election as an Associate Member. The Higher Grade Certificate in Gas Supply admits to the class of Associateship.

### PUBLICATIONS.

Copies of the Royal Charter and By-Laws, Forms of Application for Admittance to the Institution, and copies of the Education Scheme (which is being revised) and of the 1932 Examination Questions set by the Institution, can be obtained from the Secretary of the Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1.

The next Examinations in Gas Engineering will be held on April 29, 1933, and in Gas Supply on May 6, 1933. The Education Calendar for 1933 will be available in December next.

### CHARLES HUNT MEMORIAL MEDALS.

The Charles Hunt Memorial Medals, generously endowed in 1930 by Mr. P. C. Holmes Hunt, on behalf of himself and his brothers and sisters, in memory of their father, are awarded each year to the candidates who achieve the highest standards in the Examinations for the Diplomas in Gas Engineering and Gas Supply, provided such standard satisfies the Council, on the recommendation of the Gas Education Committee and the Board of Examiners. The Medal in the Diploma Examination in Gas Supply is awarded for the first time.

### PERMISSION TO SIT FOR EXAMINATION.

The attention of all students is drawn to the decision of the Gas Education Committee that 1932-33 shall be the final year for the examination of candidates who have been given " Permission to Sit " in previous years with qualifications which are now inadequate. Permission to Sit is given only in respect of the Examination to be held next after such permission is granted. Students have to comply with the Regulations in force at the time of their Examination.

### ENTRIES FOR ANCILLARY SUBJECTS.

Notification of a candidate's intention to present himself for Examination in a Subject ancillary to Gas Engineering or Gas Supply must be received by the Secretary of the Institution before Jan. 15 in each year, and not by Feb. 28, as given in the Education Scheme. External Students have to satisfy themselves that they are working to the Syllabus of the Examining Authority in whose area they reside and by whom they would normally be examined. Copies of such Syllabuses can be obtained from the Examining Authority or the Institution. Candidates are responsible for entering themselves for the Examinations on receipt of instructions from the Institution to that effect, which are issued after the Secretary has received notification of the candidate's intention to present himself for examination in certain subjects.

# PERSONAL

### RETIREMENT OF MR. J. W. BUCKLEY.

"Many years of happy leisure" is our wish for Mr. JOSEPH W. BUCKLEY, M.Inst.C.E., who has retired from the position of Engineer and General Manager of the Hornsey Gas Company, which he has held since 1908. In this period of 24 years the make of gas has practically doubled, and is now about 900 million c.ft.; while the capital per million has gone down from £540 to the extremely satisfactory figure of £434. The Board have marked their appreciation of Mr. Buckley's valuable services by appointing him a Director of the Company. This is in accordance with an excellent policy which we are glad to find is increasingly favoured among gas companies. It is a step upon which Mr. Buckley is to be congratulated; and may we add that it is a step upon which the Company also are to be congratulated?

A good many compliments could be paid Mr. Buckley on his management of a progressive Company; but we will mention only one matter—a matter of natural pride to him. At the last meeting of the Hornsey Company the Chairman, Mr. A. M. Paddon, M.Inst.C.E., referred, as he had done on previous occasions, to the fact that they were selling gas at the lowest price for the whole Metropolis in any complete area; and this, we believe, is a position which has existed over a number of years.

#### CONSEQUENT PROMOTIONS.

Consequent on Mr. Buckley's retirement, the following promotions of the Company's officials have been made:

Mr. K. LESLIE MORTIMORE, A.C.A., Secretary. To be General Manager and Secretary.
Mr. KENNETH GANDON, Assistant Engineer. To be Engineer and District Superintendent.
Mr. H. C. RATCLIFFE, Chief Chemist. To be Chief Works Assistant and Chemist.

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### PLYMOUTH GAS COMPANY'S NEW CHAIRMAN.

The Directors of the Plymouth and Stonehouse Gas Company have elected Col. R. L. NORRINGTON, C.M.G., Chairman and Managing-Director, in the place of Mr. J. H. Ellis, who resigned those offices. Mr. J. H. ELLIS was elected Deputy-Chairman.

#### OFFICIAL APPOINTMENTS.

The Directors have also made the following appointments:

Mr. A. R. LANGFORD, Distribution Superintendent, in the place of Mr. J. A. RICHMOND, who retired on pension.
Mr. J. H. DYDE, M.Sc., Sales and Technical Superintendent.

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After thirty-four years' service, Mr. J. A. RICHMOND, Distribution Superintendent of the Plymouth and Stonehouse Gas Company, has just retired, and to mark the occasion he was, on Wednesday, July 20, presented at the Company's premises at Coxside with a portable wireless set and table. The presentation was made by the Chief Engineer, Mr. R. J. H. Clark, who said it was interesting to note that during Mr. Richmond's period of service the number of men employed in his Department had increased three to four times, the output of gas had nearly doubled, and the number of consumers increased from considerably under 30,000 to nearly 46,000. Mr. P. S. Hoyte, lately Chief Engineer of the Company, wrote expressing regret at inability to attend, and recorded his appreciation of Mr. Richmond's "most valuable work and ready assistance." Mr. F. Allen, senior official in the Stoves and Fitting Department, also paid a tribute to Mr. Richmond's work. In responding, Mr. Richmond referred to the happy relationship that had always existed between the staff and himself. He mentioned that he started his 52 years' association with the Gas Industry with the Leicester Corporation.

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Capt. W. J. LIBERTY (late Hon. Secretary of the Association of Public Lighting Engineers) is a member of the Committee set up by the Home Office, the Ministry of Transport, the Scottish Office, the National Safety First Association, and kindred organizations concerned, to investigate the causes of fatal accidents on the road. When the investigation is completed a report will be presented.

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At a meeting of the Cornish Association of Gas Managers held at Truro on July 20 Mr. W. H. SAINSBURY was presented by the members with a "Revelation" attaché case and a silver mounted ebony walking stick on his retirement from the position of Secretary of the Truro Gas Company. The President of the Association (Mr. F. G. Kingwell), in making the presentation, said that Mr. Sainsbury had been a member of the Association since its inception 24 years ago, and the members were anxious to show, in some small way, their appreciation of his services. Mr. Sainsbury had proved a very useful member of the Association and had rendered valuable help and assistance in many ways. He (the President) hoped he would live many years to enjoy his retirement. Mr. Sainsbury suitably acknowledged the gifts, and was subsequently elected an Hon. Member of the Association.

# OBITUARY

Mr. JOHN READE FALKNER, who has died at Durham at the age of 75, was a Director of the Newcastle-upon-Tyne and Gateshead Gas Company. During the war years he was Chairman of Sir W. G. Armstrong, Whitworth, & Co.

# CORRESPONDENCE

## *Mr. S. M. Milbourne's Articles on "Spiral Gasholders"*

SIR,—Please allow me to commend the author, Mr. S. M. Milbourne, for his excellent series of articles recently published in the "GAS JOURNAL" entitled "Spiral Gasholders." These articles, while written in the language of the structural engineer, should be very enlightening to the gas engineer, and give him some insight into the care which is taken in designing the structures with which he is so familiar.

The spiral guided holder has not been popular in the United States, all low-pressure gas storage being done up to a few years ago in the guide-framed holder. However, since the advent of the waterless gasholder in the United States in 1924, a serious competitor to the guide-framed holder is in the field. The waterless gasholder has made rapid strides in the past eight years, and has shown itself entirely practical and economical. For certain poor soil conditions the waterless holder possesses a distinct advantage over the water tank guide-framed holder, due to the absence of the tremendous water load.

From the article by Mr. Milbourne in the Jan. 27 issue of the "JOURNAL," the following quotation is taken:

> "From experiments respecting the behaviour of wind on gasholders it has been found that not only is a wind pressure exerted on one side of the structure, but a partial vacuum or suction is also set up which acts over an area of the side sheeting bounded by more than three-quarters of the circumference of the floating holder."

May I ask Mr. Milbourne, through the "JOURNAL," if the experiments referred to were made on full size gasholders or on small models? I think that some of our American engineers will be interested in having full data on any experiments which have been made on these structures.

Also allow me to commend the "GAS JOURNAL" for the publication of these interesting articles.

Yours, &c.,
J. RICHARD DORSEY,
Assoc.M.Am.Soc.C.E.

3012, *Beverly Road*,
*Baltimore, Maryland*,
*July* 14, 1932.

## *Holding-Down Bolts of Disc-Type Gasholders*

SIR,—I cannot understand why, in his letter published in the "JOURNAL" of the 20th inst., Mr. S. M. Milbourne quotes against me a formula which is only supposed to be applicable to a flexible type of holder, whereas I have been recently dealing with a rigid structure.

I have only just seen, for the first time, the article from which the formula named emanates, and in my opinion the latter is the result of reasoning which is based upon a fallacy, which fallacy, however, does affect the question at present under discussion. The author of the article referred to has apparently not grasped the fact that my original formula was based upon the supposition that all resistances were brought down to and along a single diameter perpendicular to the neutral axis of the holder, and that all the terms involved were multiplied by 2 simply because there was, for a rigid structure, a resistance at each end of the said diameter. This had nothing to do with the fact that there were two lever-legs (so to speak) on each side of the central radius. In other words, if the author of the article mentioned desired to note the existence of these pairs of lever-legs in his calculations, one of the terms (for example) would require to be written as

$$\frac{2\left[\frac{F}{2}\right].m^2}{R}$$

Under the circumstances, I see no reason to alter my views as to the adequacy of the formula objected to, for the present purpose intended; and I see even less reason, if that be possible, for Mr. S. M. Milbourne's intervention.

Yours, &c.,
A. GADD.

62, *Barton Arcade, Manchester,*
*July* 23, 1932.

"**The Use of Gas as a Fuel in Industry.**"—A reply by Mr. Helps to Dr. Walter's letter in last week's issue (p. 141) is unavoidably held over.

# THE NEWS OF THE WEEK

**South Metropolitan Dividend.**—The Directors of the South Metropolitan Gas Company have declared an interim dividend of 2½ p.ct. actual on the ordinary stock for the six months ended June 30, 1932.

**Institution of Chemical Engineers.**—The 1932 Associate-Membership Examination of the Institution has been held, and, as on previous occasions, the candidates were entertained at dinner at the Chemical Club, after which the *viva voce* session was held.

**A Syndicate** in the South has offered to purchase Nelson's gas undertaking. The Syndicate was stated by the Gas Engineer to be largely interested in electricity, and the Engineer suggested they might be trying to invest their money in gas because the future of gas offered better security than electricity! The Committee turned down the application.

**Commercial Gas Company's Dividend.**—The Directors of the Commercial Gas Company have declared an interim dividend on the ordinary stock of the Company for the half-year to June 30, 1932, at the rate of 5 p.ct. per annum (less income-tax) payable on Aug. 15. An actual dividend at the rate of 6 p.ct. per annum was paid for the corresponding half-year of 1931.

**The Joint Annual Meeting** of the Iron and Steel Institute, whose President is Col. Sir Charles Wright, Bart., K.B.E., C.B., and the Institution of Metals, under the Presidency of Sir Henry Fowler, K.B.E., LL.D., B.Sc., is to be held in the Rooms of the Institution of Civil Engineers, Storey's Gate, S.W. 1, from Sept. 12 to 15, when a varied programme of business and social events has been arranged.

**West Wickham are Economizing** in the matter of their public lighting during the summer months, for they have decided that the lamps in their area, with the exception of those in three of the main roads, are not to be lighted during July and August. Residents who complained to the Bromley Rural Council that as a result the side streets are dangerous after dark have been told that the necessity for economy prevents the lamps being lighted before September.

**The Following Price Reductions** have been effected in Scotland: At Selkirk the rate has been reduced by 2½d. per 1000 c.ft., making it 3s. 6½d. for ordinary consumers and 3s. 9d. for prepayment meter users. At Burntisland there has been a reduction of 2½d. (from the August survey), making it 3s. 9d. At Galashiels there has been a reduction of 4d. The new rates are: Ordinary consumers 3s. 2d. per 1000 (with 15 p.ct. discount for power users); prepayment consumers 3s. 7d. per 1000. At Dundee, where a progressive scale of reduction to large consumers has been adopted, there has been an all-round reduction of 2d. The Buckhaven and Leven Gas Board are to lower the price from 4s. 4d. to 4s. 2d.

## Irish Association of Gas Managers.

### Programme for the Annual Meeting.

The Association will hold their Annual Meeting in Jury's Hotel, Dublin, on Tuesday, Aug. 16, under the Presidency of Mr. L. G. Young, of Carlow, who will deliver his address. In addition to the formal business, two papers are to be submitted—one by Mr. C. W. Surman, on "Some Sales Methods adopted at Ballymena," and the other by Mr. F. G. McElwee, of Coleraine, entitled "Vertical Retorts for Small Gas Undertakings." At the conclusion of the morning session, members and their friends will, at the invitation of the President, have light refreshment in the hotel.

The afternoon will be devoted to a meeting of the Irish District Executive Board of the National Gas Council. This will also take place in the hotel, under the chairmanship of Mr. W. J. Grey, General Manager and Secretary of the Alliance and Dublin Consumers' Gas Company, and all members of the Association are invited to attend. Mr. E. J. Fottrell, Joint Manager of the National Gas Council, and Mr. J. C. Walker, Secretary of the British Commercial Gas Association, will be in attendance, and will review the work accomplished by their organizations during the past year. In the evening members and friends will dine together in Jury's Hotel, at the invitation of the Chairman and Directors of the Carlow Gas Company, Ltd.

On the following day, Wednesday, an excursion has been arranged to Hill of Howth, the start being from Amiens Street Station at 11.45. Dinner will be served in the Waverley Hotel.

Arrangements have been made for the Golf Competition for the Grant Cup to take place on Thursday morning on the Woodbrook Golf Links.

## The Institution of Gas Engineers.

### Course in Business Administration.

The attention of members and students of the Institution of Gas Engineers is drawn to the Course in the broad principles of Business Administration provided by the Department of Business Administration at the London School of Economics. The Course was established in 1930 through the joint efforts of leading business firms and the School Authorities, the founder firms including the Gas Light and Coke Company and the South Metropolitan Gas Company. The Department's Course comprises, for full-time students, the Principles of Marketing, Production, and Business Finance, Business Economics and Personnel Management, Statistics and Accounting from the point of view of executive control.

A preliminary general Course given mainly in the even-

*THE NEWS—continued.*

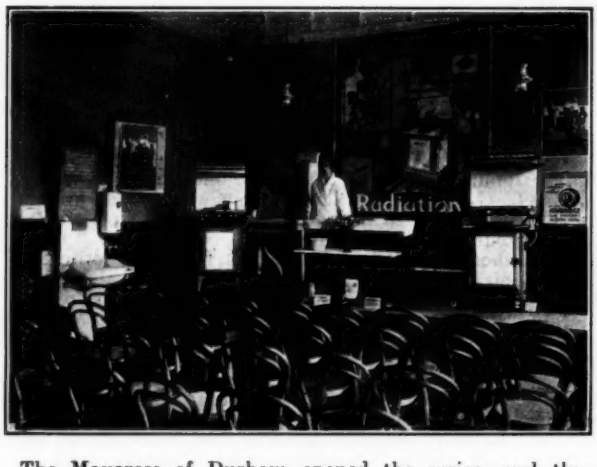
ing is provided for students who require training before admission to the full-time business Course. Students comprise University graduates and men and women possessing a good general education and not less than three years' business experience in posts of some responsibility. As a rule students should be between 20 and 30 years old. During its first teaching year which ended in June, 12 students attended the full-time business course, and 15 started the preliminary evening course. During the forthcoming year Courses in Sales Management and Retail Store Management will be added. Applications for the next Session are now being received, and further information, together with application forms, may be obtained from the Secretary of the Institution of Gas Engineers, 28, Grosvenor Gardens, S.W. 1, or from Mr. Jules Menken, Head of the Department, at 11, Clement's Inn Passage, W.C. 2.

### Guide to Aerodrome Lighting.

Copies of the recently issued British Standard Guide to Aerodrome Lighting (No. C.C. (ELG) 7631) may be obtained, price 2s. each, from the Secretary, the Institution of Gas Engineers, 28, Grosvenor Gardens, S.W. 1.

## Cookery Demonstration at Durham.

The City of Durham Gas Company believe that in meeting competition, the best defence is in attack! The series of Cookery Demonstrations given in their own showrooms, and which concluded on the 15th inst., is already proving the wisdom of this go-ahead policy.




The Mayoress of Durham opened the series, and the demonstrations were given by Miss Jaques, Diplomée. N.T.S.C., of Radiation Limited.

As always, the "New World" cooker proved fully equal to the spectacular cooking feats required of it; and the impression left on the audiences was that gas, in Durham at any rate, is likely to keep the lead for many more years to come.

## Redditch Gas Company Adopts Pension Plan.

The Directors of the Redditch Gas Company have entered into an agreement with a prominent insurance company under which, as from July 1, 1932, the employees of the Company are assured of provision for their own old age and protection for their dependents in the event of their death or total and permanent disablement. This is secured by a new group pension and life insurance policy, under which all the Company's employees are graded for benefits, and contributions towards the cost of the scheme are in accordance with a schedule based upon their respective earnings.

The scheme provides for life insurance, ranging from £100 to £300 for each employee during employment, continued after retirement at the fixed amount of £100 irrespective of grade; payment of life insurance as disability benefit in monthly instalments during life time in the event of total and permanent disability before age 60; and an adequate pension payable to each employee upon reaching the normal retirement age of 65 or earlier if necessary.

The cost of the scheme is to be borne partly by the Company and partly by the employees, the contributions of the latter being wholly recoverable if desired in the event of leaving the employ of the Company, or in case of death in addition to the amount of life insurance. All employees of the Company are eligible to join the scheme without medical examination, and it is gratifying to learn that every person employed at its inception has joined.

Another valuable feature of the scheme is that the insurance company will provide at their own expense for the attendance of a trained nurse in case of sickness or injury.

Although, as previously mentioned, the scheme has only been in operation since the beginning of July, its value to the workers has already become manifest. After only two weeks' membership of the scheme one of the employees of the Company has unfortunately died suddenly, and his widow has promptly received a substantial sum in respect of life insurance.

## Bristol Gas Company's Pensioners at Tea.

With their service amounting to nearly 850 years, 24 employees of the Bristol Gas Company who have been pensioned during the past year received their long service certificates at the offices of the Company on July 19.

The occasion was the annual tea given to the pensioners by the Company, and the number attending was more than ever before.

Of the 100 odd men who are now in receipt of pensions, nine have served 50 years and over, and 35 between 40 and 49 years.

Those present at the function included Mr. George H. Boucher (Chairman of the Company), Mr. Frank N. Cowlin (Director), Mr. S. E. Halliwell (Secretary and Commercial Manager), and Mr. R. Robertson (Engineer). The pensioners were welcomed by Mr. George H. Boucher, who referred to the death of Sir George Davies and remarked that there was no activity connected with the Gas Company in which their late Chairman had such a great interest as the pensioners' tea.

The Board, he said, was glad to be able to reward with pensions those men who had grown old in the service of the Company, while he thought that the fact that about 80 p.ct. of the pensioners were active enough to be present showed what a healthy industry gas was.

The pensioners' fund, he pointed out, was established to enable people who had been loyal in their service and done their duty to receive some consideration from the funds of the Society. The Board were only too glad to give them the reward to which they were entitled for long and loyal service.

The recipients of long service certificates received them from the hands of Mrs. Boucher, who was the only lady present, and a vote of thanks on behalf of the pensioners was afterwards proposed by Mr. F. Townsend.

His proposition was seconded by Mr. George Clarke, and Mr. Cowlin replied on behalf of the Board.

## Bristol Instrument Company's Products to be Manufactured in England.

The many users of Bristol instruments will be interested to hear that a new Company is being formed to manufacture the Bristol range in Great Britain. This step follows the recent visit to this country of Mr. Howard Bristol, President of the Bristol Company, Waterbury, U.S.A.

Arrangements have been made with J. W. & C. J. Phillips, Ltd., who have represented the Bristol Company in England for 43 years, for the manufacture of Bristol's indicating, recording, and controlling instruments to be carried on at their modern works located at New Cross, London. All the employees are British, and among them are instrument engineers of many years' experience and a high standard of skill.

The wide experience of the Parent Company's Research Department and specialized engineers will be available to the British Company.

## Guide to Aerodrome Lighting.

In few cases, if ever, is standardization of more importance to safety than in connection with the light signals and lighting appliances used for the guidance of night air traffic. The standardization of marine lights was effected many years ago, but night flying is relatively so new that the new "Guide to the Lighting of Aerodromes" is the first official pronouncement which gives, in a concise, readable form, detailed information on the characteristics and methods of use of the lights required on an aerodrome.

In the new guide the functions of the various lights are first explained, and then follows a description of the manner in which a pilot will use the indications as he approaches and lands at the aerodrome. After this introduction, definitions are given together with brief specifications of the five types of lighting equipment which are recommended as

the minimum requirements of a properly equipped aerodrome. The following apparatus is specified: A location beacon, boundary lights, illuminated wind indicator, obstruction lights, and landing floodlight. As a conclusion, extracts from appropriate international regulations are reproduced.

The guide has been prepared more particularly for local aerodrome owners, aircraft operators, municipal authorities and pilots, but although reports and technical papers dealing with this subject have been available for the expert, this new summarized guide should be of considerable value to expert and non-expert alike.

Copies of the guide (Reference No. C.C. 7631) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1, price 2s. 2d., post free.

# *International Congress on Commercial Education . .*

## Sir David Milne-Watson's Address as President

The opening meeting of the International Congress on Commercial Education was held on Monday in the Hall of the Grocers' Company, Princes Street, E.C. 2, when the Lord Mayor of London (the Rt. Hon. Sir Maurice Jenks) welcomed the delegates.

### Sir David Milne-Watson Takes the Chair.

At the conclusion of the Lord Mayor's welcome, Sir David Milne-Watson, who is President of the Congress, took the Chair, and proposed a vote of thanks to the Lord Mayor for his presence at their opening meeting. The Lord Mayor was a busy man, said Sir David, and they appreciated very highly that he had found time to attend the opening of their Conference. The City of London had always taken the utmost interest in commercial matters and did a great deal for education.

Continuing, Sir David extended a very warm welcome, on behalf of the British Association for Commercial Education, to the foreign delegates who had come from such long distances to honour their Congress in London. They had visitors from all parts of the Continent and from across the Atlantic. They in Great Britain considered it a very great honour for so many ladies and gentlemen to have found their way to this Congress. London had a great reputation in the commercial world, and he was sure that this visit, which many of them were paying for the first time, would prove extremely interesting. He sometimes thought that the future of the world, the peace of the world, and the happiness of the world depended very largely upon the commercial and business men. Their interests were undoubtedly the interests of peace. They would find that as the countries came together commercially, they would have the greatest disinclination to quarrel internationally. This drawing together in commerce and industry was one of the things which made for peace more than anything else.

### Sir Francis Goodenough's Welcome.

Sir Francis Goodenough then addressed the Conference: On behalf of the British Association for Commercial Education, he said, whose birth followed the Amsterdam Congress and whose privilege it has been to make the preparations for this London Congress, I extend a very hearty welcome to you delegates who have come from so many countries to meet us here in conference. We of the British Association look forward to deriving—as we hope you will derive—great advantage from the papers to be read and the discussions upon them at this Congress, for those papers, like the programme which we of the Association are setting before us, cover a field far wider than that originally thought of when one spoke of "commercial education."

At one time, the term commercial education was used to comprise almost exclusively the office arts of account keeping and correspondence—accomplishments useful enough in themselves, but of only secondary and quite minor importance compared with the accomplishments essential to the successful conduct of commerce, that is to the finding, securing, developing, and maintaining of markets.

Education and training that will fit men and women for the efficient conduct of commerce in all its varieties and complexities; that will fit some for leadership, that is for original conception and effective administration and direction; others for the practical every-day work of buying and selling; and others for the accurate recording of transactions and the skilful conduct of correspondence—that is what we understand by commercial education, or, as I prefer to denominate it, education for commerce—a complex problem of great interest and vital importance. And as the problem is threefold in structure—the production of the creative leader, the skilful seller, and the competent clerk—so are there three parties that have to be interested in and co-operate in its solution—the parent, the educationist, and the employer.

We hope that the holding of this Congress may help to arouse interest among all three of these parties, and most of all among employers; and that it may forward materially the cause of Education for Commerce on broad cultural as well as useful vocational lines. Let us all determine to do our individual best to secure that collective gain for all.

### Vote of Thanks to Sir David Milne-Watson.

Proposing a vote of thanks to Sir David Milne-Watson at the close of the first session, Viscount Burnham, G.C.M.G., C.H., LL.D., said that Sir David was emphatically the right man in the right place. He was, as they knew, the acting head of one of the greatest of their industrial undertakings, the Gas Light and Coke Company, and also Chairman of the National Gas Council; and in that capacity he had set an example in the application of science to industry—for which the Gas Industry had always been conspicuously notable—and had shown the way for industry as a whole to follow. He stood emphatically for the governing idea of commerce at this time—service to humanity, which was the inspiration which guided them there to that Conference.

Sir John Gilbert remarked that as a member of the L.C.C., the Education Authority for London, it gave him great pleasure to second the vote of thanks to their Chairman. He would like all the delegates to this Conference to know that Sir David Milne-Watson was an employer of labour who practised what he preached. There was no employer of labour who had co-operated in London with the local education authority to set on foot a far-reaching scheme of education for commerce to a greater degree than Sir David. In one of the technical institutions near the Houses of Parliament [Sir John Gilbert was referring, of course, to the Westminster Technical Institute] there were day continuation classes mainly attended by young employees of the Gas Light and Coke Company, of which Sir David was the guiding spirit, who allowed these young people ample time off during their working day to continue valuable commercial and technical education. If all the employers in London would only follow the outstanding example of Sir David Milne-Watson in this respect, then some of the ambitions of the Association of Education for Commerce would be realized much more quickly than even its hopeful supporters anticipated at the present time.

### Sir David Milne-Watson's Presidential Address.

[Extract.]

**[Delivered on Monday Afternoon.]**

The subject of education in commerce is a very large one and has many ramifications. It is one of supreme interest at the present moment and is engaging the attention of educational experts and commercial men in all parts of the world. Many Committees have discussed the question—notably the one in this country presided over by Sir Francis Goodenough which has only recently reported. The state of commerce and industry in all parts of the world is such that, whether we like it or not, attention has to be given to this subject.

It is not my intention this afternoon to try to cover in detail the whole ground of this vast subject, but merely to make a few general remarks. I welcome this Congress because I have always been extremely interested in education and educational questions. There was a time when education was thought of as at best an ornament and at worst a handicap in business. Now the subject upon which we are gathered together to exchange views is recognized

as being no less vital to commerce than to the older professions.

We who are engaged in industry and commerce cannot think too closely and sincerely about education as it affects our own particular problems; but we can easily talk too much about it.

General reflections on business and salesmanship and the best way of training men and women to make them most efficient agents is very far from being new. Let me give you a quotation. "It is a dangerous thing to neglect a great fair and to seek to make markets afterwards." Does not that sentence sound like a quotation from a present-day leading article or a speech by a Cabinet Minister, urging British industrialists to reap the benefits of the British Industries, or the Leipzig, or Buenos Aires Fair? But I have, in fact, taken it from the translators' preface to the Authorized Version of the Bible, and even at that date it was not new, for the learned Elizabethans were themselves quoting from a very much earlier authority.

### To-Day's Problem.

The problem of the world to-day is not with the men who are born with real genius—the problem is how to prepare those who are going to carry on the ordinary work of a business. How are they to be made efficient, and what kind of education should they have? Let me remind you—I make no excuse for reminding you because it is very often forgotten—what education really means. It means the bringing out, the development of the qualities that are to be found in a man. In other words, it is exactly the opposite of "stuffing" a man with a lot of information for which he has no capacity. Education brings out the qualities that are within the man—powers of observation, powers of initiative, powers of imagination—rather than gives him a large stock of comparatively useless facts.

Now, knowing these facts, how do we apply them in practice? What is our attitude with regard to business and commercial education, bearing the fact in mind that we are now discussing the supply of men and women to existing businesses and not I think, at the moment, troubling ourselves with the creation of new businesses, which are usually the product of one inventive and far-seeing mind?

The first thing business wants is the supply of men of character. No man without character is or ought to be a success in business, and men of indifferent character are not wanted in any ordinary business. Lack of character, especially if combined with cleverness, leads to all the scandals and disasters that have been so unfortunately prominent in the world of recent years.

### The Essentials of a Business Man.

Now what is the best education for an ordinary man about to enter business? It is to my mind an all-round training which will develop his observation, initiative, and self-reliance, and make him honourable and a loyal team worker. These are the essentials to my mind in forming the foundations of a business man. After that, in addition to a sound general education, it is a great advantage, when entering business, to have some knowledge of accountancy and, say, commercial law or another special subject.

It is also very desirable for anyone who aspires to make a position in industry to take an interest in the larger problems of the world. There is, however, a danger here. Too much attention may be given to general world problems, and a man may thus scatter his interest and energy. I firmly believe in the value of giving all a wide outlook, but it must be carefully impressed upon all students that merely talking generalities is not "doing the job." It is vitally important for each one of us to remember that, however much we may be interested in general questions and the larger questions that are at present occupying the world, our personal duty is to attend to our own business and devote ourselves to the details which constitute that business, for in this way we are directly contributing to the prosperity of our country.

Recently I was told of three young men who wished to be employed in a Company. Two of them who had attended lectures and received what is usually styled a "commercial education," said that they wanted executive posts. When asked what they meant, they said "statistics!" The third said he wanted to offer his services as a business-getter. Now statistics are, of course, of vital importance. But which of these men would you think would turn out to be the most useful and the most likely to make his mark?

One of the difficulties with young men is that they always want to know what their ultimate positions will be. Well, in business that is difficult to say—there is only one chairman, one secretary, one general manager—there are very few posts at the very top. A single business is not like the law or medicine, where the field is open to a great many and where a great many may make a big success. Most businesses when seeking for a man to fill a position of importance look round to see if any of the staff are worthy of promotion. This means that a man will be given his chance. And if a man from the university or public school will take his chance, and if he shows exceptional ability and merit and a real desire to learn, which is not daunted by any obstacles, the prize will be his. It is as a rule only if they fail to find a fit man on their own staff that the heads of a firm look outside. But this difficulty of persuading them to take their chance is one of the great hindrances to inducing some of our more highly educated young men to enter on a business career. They all want to know what their future is to be, and it is quite impossible to tell until they have been some time in business.

### The Gas Light and Coke Company's Pupilship Scheme.

It will, I think, be relevant for me to give you a brief summary of a Pupilship Scheme for public school boys, begun six years ago by the business side of my Company and now about to be extended. This may, I trust, prove of interest to the foreign delegates.

The policy of filling vacancies on the engineering and chemical staffs by honours graduates from the Universities was already long established and fully justified by its results. The new scheme has also proved successful and has shown that there is scope in the Company for the best type of public school boy.

Candidates must be between 16 and 18 and have passed either the General Schools Examination with matriculation exemption or some other approved examination of equal standard. It is desirable but not necessary that they should have been on the science side at school and have passed with "credit" in either physics or chemistry in the General Schools Examination. A good all-round record not only at work, but also at games and in the life of the school or house, is expected.

Each successful candidate will serve a pupilship of four years on an allowance starting at £100 a year and rising to from £145 to £160 in the last year. No premium is required. No staff position after pupilship is guaranteed, but there is every probability of a boy who has shaped well during his training, being appointed at about £200 a year.

Pupils are given an all-round experience on the business side of the Company. There is no intention of limiting pupils to any particular department. The special bent of each boy is sympathetically watched. Arrangements have been made that in future all pupils will spend a short time at one of the Company's manufacturing stations, in the General Manager's Office, and in the Welfare Section of the Company.

Candidates are chosen once a year in the Summer Term, usually some time in June. The course of training and the classes, arranged in conjunction with the Board of Education, start towards the end of September. Applications are considered at any time but the lists for each year are closed in May.

Several pupils who entered in the first years of the pupilship scheme are already holding positions of some responsibility in the Company. Two are on the headquarters staff of the Gas Sales Department; another is engaged in advising manufacturers in the growing industrial area in North-West London as to the application of gas to the particular needs of their industry for process work, &c.; another is engaged in the workshops where the Company design and manufacture special industrial gas appliances, while another is engaged in negotiating with builders in connection with building schemes in the northern suburbs.

The policy of the Directors is to fill the senior posts in the Company almost entirely by promotions from within its own ranks and to make promotion wholly dependent on merit.

Senior officers at headquarters, chiefs of special sections, and managers of local offices or groups of offices have to be appointed. All these posts will be open to pupils who may in time prove competent to fill them.

This scheme is, as you will see, on a relatively modest scale, but I felt that it was worth mentioning as being an example of a systematic attempt to recruit boys of high educational qualifications into industry. System is the essence of recruitment; for it teaches candidates and their parents and masters to know when and where to look for openings.

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### President's Luncheon.

In connection with the International Congress, Sir David Milne-Watson and Lady Milne-Watson gave a luncheon at the Carlton Hotel on July 21 to the leading delegates to the Congress and the Committee of the British Association for Commercial Education before their attendance at their Majesties' Garden Party, where the delegates had the honour of being presented to their Majesties.

# 1932 INSTITUTION : EXAMINATIONS :

## List of Successful Candidates in the Examinations in Gas Engineering and Gas Supply of the Institution of Gas Engineers

The undermentioned Candidates were successful in the 1932 Examinations in Gas Engineering and Gas Supply of The Institution of Gas Engineers, held under the revised Regulations of the Education Scheme of The Institution of Gas Engineers, as approved by the Government Education Departments of Great Britain and Ireland, and the City and Guilds of London Institute.

The Results do not include Candidates (*a*) who withdrew before the Examination, or (*b*) who, having Second Class Certificates, re-sat and failed to secure a First Class Certificate, or (*c*) who have not secured a First Class Pass in the Single Subject Examinations, or (*d*) whose Examination has not been completed.

The Charles Hunt Memorial Medal in the Diploma Examination in Gas Engineering for 1932 is awarded to J. H. Dyde, M.Sc., Assoc.M.Inst.Gas E. (Plymouth).

The Charles Hunt Memorial Medal in the Diploma Examination in Gas Supply for 1932 is awarded to Lionel Poulter (London).

J. R. W. ALEXANDER,
*Secretary.*

*28, Grosvenor Gardens,*
*London, S.W. 1.*
*27th July*, 1932.

*Comparative Statistical Schedule of* 1931 *and* 1932 *Examination Results.*

| Examinations. | 1931. | | | | | 1932. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | First Class. | | Second Class. | Failed. | Total Sat. | First Class. | | Second Class. | Failed. | Total Sat. |
| | Distinction | — | | | | Distinction. | — | | | |
| External— | | | | | | | | | | |
| Diploma in Engineering | .. | 3 | 3 | .. | 6 | 1 | 3 | 5 | 2 | 11 |
| H.G. Engineering | 1 | 4 | 5 | 3 | 13 | 1 | 4 | 9 | 9 | 23 |
| O.G. Engineering | .. | 1 | 13 | 11 | 25 | .. | 5 | 14 | 12 | 31 |
| O.G. Engineering (single subject) | .. | .. | .. | .. | *Nil* | .. | 1 | .. | .. | 1 |
| Diploma in Supply | .. | .. | .. | .. | *Nil* | .. | 1 | 1 | .. | 2 |
| H.G. Supply | .. | .. | 3 | .. | 3 | .. | 2 | 5 | 1 | 8 |
| O.G. Supply | 1 | 2 | 8 | 1 | 12 | .. | 3 | 6 | 4 | 13 |
| O.G. Supply (single subject) | 1 | 2 | 1 | 2 | 6 | .. | .. | 2 | .. | 2 |
| Internal— | | | | | | | | | | |
| H.G. Engineering | .. | 11 | 30 | 13 | 54 | 2 | 24 | 29 | 20 | 75 |
| O.G. Engineering | 2 | 8 | 24 | 19 | 53 | 2 | 16 | 36 | 15 | 69 |
| O.G. Engineering (single subject) | .. | 3 | 3 | 3 | 9 | .. | 2 | 4 | .. | 6 |
| H.G. Supply | 1 | 11 | 23 | 6 | 41 | 2 | 18 | 20 | 6 | 46 |
| O.G. Supply | 9 | 29 | 29 | 13 | 80 | 6 | 41 | 46 | 15 | 108 |
| O.G. Supply (single subject) | 2 | 3 | 3 | .. | 8 | 3 | 12 | 5 | 1 | 21 |
| Total | 17 | 77 | 145 | 71 | 310 | 17 | 132 | 182 | 85 | 416 |

### EXTERNAL CANDIDATES.

*Diploma in Gas Engineering* (9).

| Class. | Name. | Town. | Subject of Thesis. |
|---|---|---|---|
| First | Benson, D. | Bolton | "Experiments on the Removal of Sulphur Compounds." |
| ,, | Dyde, J. H.*† | Plymouth | "The Generation, Distribution, and Utilization of Steam Power on a Gas Works." |
| ,, | Johnson, C. | Liverpool | "Aspects of Zonal Failure in Vertical Retorts." |
| ,, | Kirkwood, W. O. | Sunderland | "The Heating of Retort Settings and the Recovery of Waste Heat." |
| Second | Harris, R. W. | Clitheroe | "Experimental Notes and Observations on the Automatic Calorific Control of Straight Horizontal Coal Gas." |
| ,, | Harrison, W. B. | Blackburn | "Considerations of Steam Raising for Gas Works." |
| ,, | Pye, J. W. | Ilfracombe | "Points in Control and Working Vertical Retort Settings." |
| ,, | Tran, A. | Coatbridge | "Fuel Economy in Internal Producers." |
| ,, | Webster, J. | Port Glasgow | "Boiler Feed Water Heating on Gas Works." |

* With Distinction.

† Awarded the Charles Hunt Memorial Medal in Gas Engineering.

*Higher Grade Certificate in Gas Engineering* (14).

| Class. | Name. | Town. |
|---|---|---|
| First | Jones, S. | Blackpool |
| ,, | Lord, J. F. | Darlington |
| ,, | Plummer, R. G.* | London |
| ,, | Wicks, T. R. | Middlesbrough |
| ,, | Wilkes, J. E. | Hereford |
| Second | Bantley, S. C. | Leicester |
| ,, | Cobby, G. H. | Woking |
| ,, | Cooper, I. S. | Clevedon |
| ,, | Johns, W. H. T. | Cheltenham |
| ,, | Nicholson, A. H. | Stockton-on-Tees |
| ,, | Peel, A. E. | ,, |
| ,, | Pennington, C. W. | Newbury |
| ,, | Plevin, W. E. | Blackpool |
| ,, | Wood, C. C. | Wellingborough |

* With Distinction.

*Ordinary Grade Certificate in Gas Engineering* (19).

| Class. | Name. | Town. |
|---|---|---|
| First | Davey, W. S. | Truro |
| ,, | Foster, D. A. | Stourport |
| ,, | Garside, R. B. | Morecambe |
| ,, | Jones, S. T. | Rhos-on-Sea |
| ,, | McManus, J. E. | Willington Quay-on-Tyne |
| Second | Banks, R. H. | Northampton |
| ,, | Clarke, D. A. | Southampton |
| ,, | Clegg, V. E. | Haywards Heath |
| ,, | Curtis, G. W. | Birchington |
| ,, | Dawson, P. R. | Kendal |
| ,, | Heath, C. W. | Longton |
| ,, | Lees, P. N. | West Hartlepool |
| ,, | Mortimer, K. R. | Leighton Buzzard |
| ,, | Patching, H. J. | Deal |
| ,, | Stevenson, E. W. | Leicester |
| ,, | Turner, G. | Bootle |
| ,, | Waterfield, L. | Stoke-on-Trent |
| ,, | Wilkinson, T. B. | Stroud |
| ,, | Wimhurst, J. C. | Newcastle (Staffs. |

*Ordinary Grade (Single Subject) Examination in Gas Engineering to qualify to sit for the Diploma Examination in Gas Supply* (1).

| Class. | Name. | Town. |
|---|---|---|
| First | Beech, R. | Kidsgrove |

*Diploma in Gas Supply* (2).

| Class. | Name. | Town. | Subject of Thesis. |
|---|---|---|---|
| First | Poulter, L.† | London | "Some Aspects of Space Heating." |
| Second | Bujnowski, A. | Glasgow | "Central Heating by Gas." |

† Awarded the Charles Hunt Memorial Medal in Gas Supply.

*Higher Grade Certificate in Gas Supply* (7).

| Class. | Name. | Town. |
|---|---|---|
| First | Beech, R. | Kidsgrove |
| ,, | Petersen, C. F. | East Grinstead |
| Second | Chilcott, J. A. | Swansea |
| ,, | Collinson, A. | Darwen |
| ,, | Parkyns, A. D. | Exeter |
| ,, | Sansom, F. W. | ,, |
| ,, | Symon, F. G. | Motherwell |

*Ordinary Grade Certificate in Gas Supply* (9).

| Class. | Name. | Town. |
|---|---|---|
| First | Harris, R. W. | Clitheroe |
| ,, | Wainwright, A. V. | Shrewsbury |
| ,, | Winter, A. J. | Nottingham |
| Second | Anderson, E. C. | Birkenhead |
| ,, | Corrin, C. R. | Onchan |
| ,, | Croad, G. | Mytholmroyd |
| ,, | Hartley, A. G. | Blackpool |
| ,, | Mason, R. | Kendal |
| ,, | Siddons, V. J. J. | Barnsley |

## INTERNAL CANDIDATES.

*Higher Grade Certificate in Gas Engineering* (55).

| Class. | Name. | Centre. |
|---|---|---|
| First | Allerton, H. | Liverpool |
| ,, | Anderson, E. C. | ,, |
| ,, | Brockbank, S. | Birmingham |
| ,, | Davison, R. P. | Newcastle-on-Tyne |
| ,, | Dawkins, B. | Regent Street Polytechnic |
| ,, | Derbyshire, J. A. | Blackburn |
| ,, | Dickenson, A. W. | Regent Street Polytechnic |
| ,, | Dickson, D. L. | Glasgow |
| ,, | Dow, J. M.* | Dundee |
| ,, | Gidlow, H. B. | Liverpool |
| ,, | Harrison, A. | Blackburn |
| ,, | Hart. H. J. B. | Liverpool |
| ,, | Kelly, A. F. | Newcastle-on-Tyne |
| ,, | Kenyon, G. H. | Regent Street Polytechnic |
| ,, | Laundy, E. A. | ,, ,, |
| ,, | Laws, D. B. | Newcastle-on-Tyne |
| ,, | Mitchell, J. K. | Bradford |
| ,, | Newman, R. | Regent Street Polytechnic |
| ,, | Price, P. H. J. | Cardiff |
| ,, | Risby, H. J. | Regent Street Polytechnic |
| ,, | Scott, D. W. G.* | Birmingham |
| ,, | Sturrock, N. C. | Glasgow |
| ,, | Thompson, D. M. | Manchester |
| ,, | Truslove, C. J. F. | Birmingham |
| ,, | Walsh, J. B. | Manchester |
| ,, | Wardle, N. F. D | Bath |
| Second | Baker, R. | Regent Street Polytechnic |
| ,, | Casseldine, G. E. | ,, ,, |
| ,, | Castle, J. | Bradford |
| ,, | Claydon, J. A. | Birmingham |
| ,, | Clough, J. | Burnley |
| ,, | Davey, W. | Regent Street Polytechnic |
| ,, | Eccleshare, K. G. | Derby |
| ,, | Field, E. B | Blackburn |
| ,, | Gould, A. K. | Bradford |
| ,, | Heggie, W. G. H. | Dundee |
| ,, | Hubbard, W. S. | Manchester |
| ,, | Kerley, G. | Regent Street Polytechnic |
| ,, | King, F. H. | Manchester |
| ,, | Kirk, W. | Glasgow |
| ,, | Langford, K. H. H. | Cardiff |
| ,, | Merryweather, N. H. | Manchester |
| ,, | Mills, J. E. | ,, |
| ,, | Murray, G. J. | Plymouth |
| ,, | New, W. | ,, |
| ,, | Parker, R. G. | ,, |
| ,, | Penny, A. | Regent Street Polytechnic |
| ,, | Ramsden, H. | Bradford |
| ,, | Stewart, W. A. M. | Glasgow |
| ,, | Thomas, F. D. | Cardiff |
| ,, | Vane, S. | Regent Street Polytechnic |
| ,, | Westwood, R. A. | Birmingham |
| ,, | White, T. L. N. | Cardiff |
| ,, | White, W. H. | Regent Street Polytechnic |
| ,, | Woodhead, C. A. B. | Liverpool |

* With Distinction.

*Ordinary Grade Certificate in Gas Engineering* (54).

| Class. | Name. | Centre. |
|---|---|---|
| First | Bath, D. J. O. | Westminster |
| ,, | Denoon, J. R. | Edinburgh |
| ,, | Gilchrist, W. | Glasgow |
| ,, | Henderson, D. C. | Dundee |
| ,, | Keillor, H. G. | Glasgow |
| ,, | Keir, D. I. | Birmingham |
| ,, | Leckie, J. N.* | Glasgow |
| ,, | Miller, R. | Regent Street Polytechnic |
| ,, | Nash, C. | Westminster |
| ,, | Rees, K. C. | ,, |
| ,, | Roberts, L. G. | Birmingham |
| ,, | Rose, W. | Glasgow |
| ,, | Smith, E. G.* | ,, |
| ,, | Swan, W. H. | ,, |
| ,, | Tate, W. | Regent Street Polytechnic |
| ,, | Turner, G. O. | ,, ,, |
| ,, | West, A. E. | Birmingham |
| ,, | Wilkinson, R. | Hull |
| Second | Andrews, J. L. F. | Bath |
| ,, | Black, G. H. | Manchester |
| ,, | Blackburn, W. | ,, |
| ,, | Canning, J. H. | Cardiff |
| ,, | Chambers, K. E. | Birmingham |
| ,, | Crump, S. C. | ,, |
| ,, | Cureton, R. S. | Manchester |
| ,, | Edgecombe, F. | Glasgow |
| ,, | Egan, J. | Bradford |
| ,, | Graham, J. C. | Newcastle-on-Tyne |
| ,, | Hall, A. A. | Regent Street Polytechnic |
| ,, | Hart, R. V. | Manchester |
| ,, | Haslock, R. C. | Bradford |
| ,, | Henderson, N. | Manchester |
| ,, | Hobley, J. | Westminster |
| ,, | Hollingworth, R. A. | Manchester |
| ,, | Howard, R. M. | ,, |
| ,, | Little, C. F. | Derby |
| ,, | Mitchell, C. B. S. | Manchester |
| ,, | Mitchell, W. P. | Glasgow |
| ,, | McDonald, J. D. | Edinburgh |
| ,, | Newsome, M. | Blackburn |
| ,, | Parsons, R. E. | Manchester |
| ,, | Powell, R. G. T. | Birmingham |
| ,, | Rawbone, J. W. | Westminster |
| ,, | Smith, C. M. | Burnley |
| ,, | Smith, W. J. | Birmingham |
| ,, | Stafford, J. H. | ,, |
| ,, | Suddards, F. | Bradford |
| ,, | Taylor, N. A. | Derby |
| ,, | Taylor, N. R. | Birmingham |
| ,, | Thomas, D. | Cardiff |
| ,, | Thorndyke, A. E. | Regent Street Polytechnic |
| ,, | Tilley, J. G. | Birmingham |
| ,, | Williams, J. H. S. | Manchester |
| ,, | Woodcock, J. A. | ,, |

* With Distinction.

*Ordinary Grade (Single Subject) Examination in Gas Engineering to qualify to sit for the Diploma Examination in Gas Supply* (2).

| Class. | Name. | Centre. |
|---|---|---|
| First | Atkin, F. L. | Birmingham |
| ,, | Manton, L. W. | ,, |

*Higher Grade Certificate in Gas Supply* (40).

| Class. | Name. | Centre. |
|---|---|---|
| First | Bradley, E. F. | Westminster |
| ,, | Brunton, S. | ,, |
| ,, | Cocks, K. | ,, |
| ,, | Cooke, H. R. | ,, |
| ,, | Crocker, H. S. | ,, |
| ,, | Crouch, F. M. | ,, |
| ,, | Grammer, J. M. | ,, |
| ,, | Kimble, F. J. | Birmingham |
| ,, | King, S. A.* | Westminster |
| ,, | Mayo, A. F.* | ,, |
| ,, | Melville, F. G. S. | ,, |
| ,, | Pegg, E. E. | ,, |
| ,, | Powell, A. J. | ,, |
| ,, | Reeve, C. G. | ,, |
| ,, | Sheldrake, T. W. S. | ,, |
| ,, | Swann, A. J. | East Ham |
| ,, | Thompson, A. J. | ,, |
| ,, | Wakeford, J. E. | Huddersfield |
| ,, | White, A. H. | Westminster |
| ,, | Williamson, R. | Newcastle-on-Tyne |
| Second | Brown, C. H. | Westminster |
| ,, | Burkett, F. R. | ,, |
| ,, | Coney, E. C. | ,, |
| ,, | Dick, H. W. | ,, |
| ,, | Foster, E. G. | East Ham |
| ,, | Goldsmith, J. J. | Westminster |
| ,, | Holgate, S. J. | ,, |
| ,, | Howes, W. J. | ,, |
| ,, | Hutton, J. A. D. | ,, |
| ,, | Lawson, T. W. | Newcastle-on-Tyne |
| ,, | Livett, A. E. | Westminster |
| ,, | Markham, E. | East Ham |
| ,, | Millican, A. J. | Newcastle-on-Tyne |
| ,, | Palmer, S. F. | Westminster |
| ,, | Porter, W. H. B. | Newcastle-on-Tyne |
| ,, | Pritchard, W. F. | Westminster |
| ,, | Pugh, J. E. | ,, |
| ,, | Smith, W. G. | ,, |
| ,, | Townsend, W. C. E. | ,, |
| ,, | Wilson, E. L. Kennedy | ,, |

* With Distinction.

*Ordinary Grade Certificate in Gas Supply* (93).

| Class. | Name. | Centre. |
|---|---|---|
| First | Allsop, S. F. | Birmingham |
| ,, | Avis, H. W. | Westminster |
| ,, | Bamford, G. A. | ,, |
| ,, | Bates, E.* | ,, |
| ,, | Beech, S. | ,, |
| ,, | Belsham, F. F. | ,, |
| ,, | Cardy, L. A. | ,, |
| ,, | Coltman, E. | ,, |
| ,, | Crow, E. G. | ,, |
| ,, | Culverwell, R. D. | ,, |
| ,, | Dines, F. C. | ,, |
| ,, | Duggin, E. G. F. | ,, |
| ,, | Dunbar, J. | Glasgow |
| ,, | Eames, F. | Westminster |
| ,, | Edmonds, W. H. | East Ham |
| ,, | Etches, A. C. | Westminster |
| ,, | Francis, S. | ,, |
| ,, | Gilchrist, W. | Glasgow |
| ,, | Gregory, G. T. | Westminster |
| ,, | Keillor, H. G.* | Glasgow |
| ,, | Kincaid, W. C. | Westminster |
| ,, | Khater, A. M. | ,, |
| ,, | Lane, J. | ,, |
| ,, | Leckie, J. N. | Glasgow |
| ,, | Linch, H. G. L.* | Westminster |
| ,, | Miller, H. N. | Newcastle-on-Tyne |
| ,, | Mitchell, J. K. | Bradford |
| ,, | Munns, R. M.* | Westminster |
| ,, | Nicol, D. R. | ,, |
| ,, | Pagett, E. | Birmingham |
| ,, | Raistrick, H. | Bradford |
| ,, | Ringham, J. G. | Westminster |
| ,, | Rose, W. | Glasgow |
| ,, | Rouse, D. H. | Westminster |
| ,, | Scarth, A. | ,, |
| ,, | Smith, E. G. | Glasgow |
| ,, | Smith, S. A. | Westminster |
| ,, | Stevens, G. | ,, |
| ,, | Stickland, G. W. | East Ham |
| ,, | Summerhayes, H. J. | Westminster |
| ,, | Swan, W. H. | Glasgow |
| ,, | Tarrant, A. R. | Westminster |
| ,, | Thompson, D. M.* | Manchester |
| ,, | Tyndall, K. H. | Huddersfield |
| ,, | Waterman, F. A.* | Westminster |
| ,, | Whitehead, H. | Huddersfield |
| ,, | Wright, P. G. | Westminster |
| Second | Ball, W. J. | East Ham |
| ,, | Beels, F. D. | Birmingham |
| ,, | Bland, R. W. | Bradford |
| ,, | Brand, C. H. | East Ham |
| ,, | Broomhall, J. G. | Westminster |
| ,, | Brown, E. | ,, |
| ,, | Burbage, E. G. | ,, |
| ,, | Button, B. R. | ,, |
| ,, | Cary-Barnard, D. P. C. | ,, |
| ,, | Coveney, A. C. | ,, |
| ,, | Dawson, F. | Huddersfield |

*Ordinary Grade Certificate in Gas Supply* (93)—(*continued*).

| Class. | Name. | Centre. |
|---|---|---|
| Second | Gliddon, W. | Westminster |
| ,, | Griffin, S. J. | ,, |
| ,, | Harrison, J. W. G. | ,, |
| ,, | Haydon, A. R. | Birmingham |
| ,, | Henderson, W. M. | Edinburgh |
| ,, | Hentschel, H. M. | Westminster |
| ,, | Heyman, J. H. | ,, |
| ,, | Hobbs, G. F. L. | ,, |
| ,, | Hood, I. H. R. | ,, |
| ,, | Keathery, T. A. | Birmingham |
| ,, | Mansfield, W. H. | Westminster |
| ,, | Mayhew, F. | ,, |
| ,, | Mayhew, G. | ,, |
| ,, | Mitchell, W. P. | Glasgow |
| ,, | Owen, E. | Westminster |
| ,, | Page, W. A. | ,, |
| ,, | Parker, E. R. | Birmingham |
| ,, | Payne, L. G. | East Ham |
| ,, | Pocock, G. E. | Westminster |
| ,, | Potter, G. B. S. | ,, |
| ,, | Pritcher, S. | ,, |
| ,, | Proud, E. | Newcastle-on-Tyne |
| ,, | Rhodes, N. | Bradford |
| ,, | Roberts, F. | ,, |
| ,, | Robinson, R. L. | Birmingham |
| ,, | Schroder, S. | Westminster |
| ,, | Smith, R. E. | ,, |
| ,, | Squires, S. E. | Birmingham |
| ,, | Sykes, K. | Huddersfield |
| ,, | Taylor, H. | Westminster |
| ,, | Wakelin, L. T. | Birmingham |
| ,, | Ward, C. G. | ,, |
| ,, | Wigley, W. | Westminster |
| ,, | Williams, H. V. | Cardiff |
| ,, | Young, A. A. | East Ham |

* With Distinction.

*Ordinary Grade (Single Subject) Examination in Gas Supply to Qualify to Sit for the Diploma Examination in Gas Engineering* (15).

| Class. | Name. | Centre. |
|---|---|---|
| First | Blakeley, W. F. | Leeds |
| ,, | Cowie, R.* | Edinburgh |
| ,, | Davison, R. P. | Newcastle-on-Tyne |
| ,, | Dickenson, A. W. | Westminster |
| ,, | Field, A. | Bradford |
| ,, | Hayes, T. | Leeds |
| ,, | Hemingway, C. W. | ,, |
| ,, | Kenyon, G. H. | Westminster |
| ,, | Kerley, G. E. | ,, |
| ,, | Laws, D. B. | Newcastle-on-Tyne |
| ,, | Plummer, R. G.* | Westminster |
| ,, | Partington, H.* | Manchester |
| ,, | Scott, D. W. G. | Birmingham |
| ,, | Stokes, S. H. | Huddersfield |
| ,, | Vane, S. G. | Westminster |

* With Distinction.

# GAS AT KENTISH INDUSTRIAL DISPLAY

*The Gas Industry well represented at Dartford Industrial Development Exhibition*

Reference was made in the "JOURNAL" a few weeks weeks ago to the Dartford Industrial Development Exhibition, which was held in conjunction with the Great Historical Pageant at Hall Place, Bexley, from July 18 to 23.

In addition to the Pageant, which was a masterpiece of production and included 4000 performers, a number of industrial firms in the district, many of them large users of gas, co-operated in a comprehensive industrial display, staged in a marquee some 24,000 sq. ft. in area.

### SOUTH SUBURBAN GAS COMPANY'S EXHIBIT.

The Gas Industry, in the capable hands of the South Suburban Gas Company, was well represented on an extensive stand of 1500 sq. ft. in area. The Company's display was undoubtedly one of the most striking in the exhibition, and was appropriately sectionalized into six roomy bays devoted to different phases of gas application—cooking, heating, water heating, industrial, and bye-products. The whole presented a very pleasing appearance, brightly illuminated with up-to-date gas lighting fittings and complete with suitable gas slogans.

The first bay, devoted to gas cooking, consisted of a very comprehensive range of the latest cookers in various coloured enamel finishes, including many well-known appliances and also the "Metro" cooker with the oven on top. A gas-operated "Freezolux" refrigerator was well in evidence and also a Dean washing machine with "Acme" wringer, while a show-card called attention to a series of gas cookery lectures being held in the Company's local showrooms.

The second bay comprised the heating section, and displayed gas fires in many attractive finishes, radiators, small heating stoves, &c., the outstanding feature of this section—also a "Metro" product—being the new "Lumetro" gas fire, which gives a most realistic effect of a glowing solid fuel fire, while retaining all the advantages and comfort of a gas fire. The "Urastone" surrounds, harmonizing with the various coloured finishes of the fire, were very attractive. Also in this section were examples of standard lighting fittings, gas irons, pokers, and the smoker's companion. Wright's new "Console" cabinet radiator (described in the "JOURNAL" of July 13, p. 97) was also displayed in old brass tone finish. The heating unit of this radiator is constructed of a series of specially designed refractory bricks arranged over luminous flames.

The water heating section contained a most representative selection of appliances, no fewer than eight of these being connected up and in working order, including the following well-known appliances: Ewart's geysers, in coloured enamel finishes, "White Chief," "Clarkhill," "Ascot" multi-point and lavatory basin heaters, "Newlyn," "Insuthermae," and "K.C.U." In addition, were large capacity storage water heaters finished in pleasing

shades. A bath full of steaming hot water added realism to the general effect.

All these three bays were most artistically lighted by means of panel pendants, bowls, and shades—a number being fitted with distant control switches. A particularly interesting feature in connection with the lighting was that two adjoining bays were respectively completely illuminated in the one case by ordinary standard mantles and in the other by special " Metro " daylight mantles, showing very strikingly the different types of illumination provided by each.

### Industrial Display.

The fourth and fifth bays were devoted to a demonstration of appliances relating to the industrial application of gas for the heat treatment of ferrous and non-ferrous metals and for other purposes. Open-hearth and muffle type furnaces were shown in operation, together with a quarter-scale working model of a Bonecourt gas-fired steam boiler fitted with automatic control. The full-size boiler, working on natural draught, consumes only 2¼ to 2¾ c.ft. of gas per lb. of water evaporated from and at 212° Fahr., according to the calorific value of the gas. These boilers have no firebox, and the burners are designed so that no primary air is required, and hence back-firing is impossible at any load.

A very attractive little furnace shown in operation was one suitable for jewellers' work or similar small accurate operations, this being the smallest of a range, finished in aluminium bodywork, and complete with pyrometer. This furnace will heat up to 1000° Fahr. in half an hour and to 750° in five minutes. Other interesting appliances included Keith-Blackman soldering irons and stoves, some of the irons being internally heated for continuous and intermittent work. The approximate gas consumption of the twin soldering stove shown in operation is about 13 c.ft. of gas per hour. Examples were also demonstrated of Keith-Blackman high-pressure blowpipes and automatic mixture control devices for gas heated appliances where it is important to maintain an unvarying reducing or oxidizing atmosphere. The temperature in such cases may be varied at will without upsetting the correct proportions of the gas and air mixture, the air cock only requiring to be manipulated. Also shown were examples of direct acting and remote controlled thermostats, while in this connection a very interesting exhibit showed the operation of the " Perfecta " temperature regulator, which will control with the utmost precision the temperature of gas-fired furnaces, ovens, salt and oil baths, and any other gas heated equipment. According to its application and to the maximum temperature to be controlled, the material and length of the heat detector are varied to suit the particular conditions and temperature range. This apparatus is manufactured by Messrs. Cookers & Geysers, Ltd., of 244, High Holborn, W.C. 1. A soft metal melting pot was also shown, together with an interesting " Metro " ventilating device for fixing above the gas lighting burners in factories, whereby the passage of the products of combustion from the burners through the ventilator automatically provides the ventilation of the factory.

### Oxy-Coal Gas Cutting Plant.

The Hancock-Croydon oxy-coal gas flame cutting and profiling machine, precision model, was shown in operation, this apparatus being manufactured by Messrs. Hancock & Co. (Engineers), Ltd., of Aurelia Road, Croydon. By means of this machine, over 500 of which are installed in this country, press tool dies, and similar articles can be cut nearly to finished sizes in a minute or two. There is no costly setting-up required, the operator working direct from the drawing. The machine saves all the rough work when cutting out press tool dies in steel and most alloy steels, and the die when cut is within such close limits that it requires only a small amount of finishing up.

The firm's " Rapid " metal cutting pipe gives an extremely quick, clean, and economical cut on all thicknesses of iron or steel from ¼ in. to 8 in. A special valve in the head prevents the possibility of backfire, while particular attention has been paid to the preheating flame to give a fast start. The seven jets contained in the handle of the cutting pipe enable the user to utilize coal gas, acetylene, or hydrogen, but the makers earnestly recommend the use of coal gas, claiming that it is more economical, gives better results, and is faster in operation on metals up to 4 in. thick. The gas may be taken from any existing fitting by means of a rubber tube.

### A B.C.G.A. Smoke Abatement Display.

The sixth and final bay of the exhibit was arranged in co-operation with the B.C.G.A., and took the form of a by-product and smoke abatement display of a very interesting character—centred round the familiar theme, " The Romance of a Lump of Coal." Attractively arranged in groups were the many and various derivatives of the lump of coal which stood in the background—tar products, chemicals, fertilizers, dyes, oils, and so forth—while this section also contained examples of the well-known " Metro " coke fire and other coke-consuming appliances.

Besides the appropriate slogans on the walls of the stand, already referred to, there was a map of the South Suburban Company's area of supply, showing the mains. Altogether the display was extremely effective, and those responsible are to be congratulated on their successful endeavour to bring the merits of gas—for both domestic and industrial purposes—so prominently before the public eye in this district, and good results should undoubtedly be forthcoming.

### Some Fraser & Chalmers' Exhibits.

The exhibit of Messrs. Fraser & Chalmers Engineering Works, Erith (Proprietors: The General Electric Company, Ltd.), who had an interesting display at this exhibition, included a selection from the range of plant manufactured at Erith, such as conveying and screening plant, and rolling mills. Most of the machines shown were in operation, and the whole of the apparatus shown was made in England.

The conveying plant included two 16-ft. Fraser & Chalmers-Redler conveyors, which form an economical solution to the problem of conveying powdered, granular, and small lumpy substances. The conveying is done on a chain which consists of suitably-shaped links between which some of the material collects to form a belt on which the remainder is conveyed in a quiescent mass. The conveyor is totally enclosed, and is therefore dustless and weatherproof; over small spans it is self-supporting, and it can be extended very cheaply. The speed is slow, so that the wear and tear are negligible. Capacities up to 200 tons per hour have been obtained, and the power consumption is very low, both the conveyors shown being driven by one 1-H.P. motor. A complete range of Redler machines for conveying, elevating, measuring, and blending is available.

Round two sides of the stand ran a Webb conveyor, a type that has only recently been introduced to this country for the circulation of raw material and work in production in factories. It works on a well-known principle, the efficiency of which has been improved by the use of modern developments, such as drop-forged links and ball bearings, employing an endless articulated chain suspended by ball-bearing trolleys from an overhead runway. Various floors can be traversed regardless of turns or vertical lifts, and the material can be brought down within easy reach of the operators, or high overhead where head room is required. The machine is very flexible and can be adapted to any conditions. The example shown was driven by a ½-H.P. motor.

The Sherwen screen incorporates a new principle in vibrating mechanism. The moving frame is mounted on spring slats of hickory or ash and given 2400-3000 vibrations per minute by two solenoids controlled by a make and break mechanism. The amplitude and rate of vibration and the screen angle can be adjusted during operations. There are no bearings, pulleys, belts, or shafting, and the power consumption is very small. The same principle has been successfully applied to concentrating tables for coal, sand, slimes, &c.

The more usual types of conveyors and screens were exemplified by a 20-ft. portable conveyor and a double-deck " Gyrex " screen, both of the Robins type and driven by 3-H.P. and 5-H.P. motors respectively. The conveyor is economical in first cost and maintenance, the frame being self-cleaning and the troughed belt enabling abrasive material to be handled without wear on the edges. " Gyrex " screens can be applied to almost any screening proposition; a uniform gyration of the live frame is obtained by means of eccentric bearings, and the capacities range up to 600 tons per hour.

A model washer was shown to demonstrate the principle of a patent sand flotation process of washing coal that has recently been introduced. This process is a commercial application of the laboratory float-and-sink tests, which are used for determining the washability of coal.

As has been previously mentioned, this Industrial Exhibition and Pageant was staged as the endeavour of the constituents of the Parliamentary Division of Dartford to do something of a concrete nature to stimulate trade, and it is doubtful if any district in the South of England is better equipped to bring such endeavours to a successful conclusion. We are glad to learn that the Exhibition and Pageant were a great success, both financially and otherwise.

# THE STORAGE OF COAL

Theory; Practice; Economics

[Contributed]

How to store coal with the minimum of loss and expense is a problem which confronts every gas engineer to a greater or less extent because of his obligation to maintain an uninterrupted supply of gas. A stock of coal must be kept in store against the time when a breakdown in transport arrangements, or more usually a strike, curtails his supplies for a longer or shorter period. The cost of coal is the greatest single charge in gas-making, and consequently the method of dealing with this most important raw material may influence the financial results of the gas undertaking to a considerable extent. A thorough understanding of the scientific and technical principles involved in coal storage is clearly of the utmost importance.

The problem is complicated by the fact that coal is not an inert material, and during exposure to the weather, it, like many minerals, changes fundamentally in character. Under extreme conditions, the change may result in the heap of coal taking fire with consequent expense in putting the fire out and loss of a considerable quantity of raw material for gas-making. Even in favourable conditions weathering causes reduced gas yield and reduced coking power. This reduction is not equally important with every coal, but with some coals deterioration may occur to a disastrous extent. A knowledge of which coals to store, which not to store, and the conditions under which the changes which take place are least deleterious to the general working results of the gas undertaking, is a prime necessity.

The deterioration of coal during storage is, so far as is known at the present time, wholly caused by oxidation. It is, at any rate, safe to assert that if coal is stored out of contact with oxygen, it does not deteriorate to any measurable extent. The fact that coal has been preserved in the depths of the earth for many millions of years is unmistakable evidence of the truth of this statement. To understand the effects of oxidation, it is necessary to review briefly the composition of coal.

### The Composition of Coal.

The modern conception of coal depends upon whether it is regarded as a mixture of four minerals, separable to some extent by hand, or whether it is regarded as a chemical body, separable into its constituents only by solution and chemical methods. Coal, from the first viewpoint, is considered as consisting of fusain, durain, clarain, and vitrain—the four banded constituents first described by Dr. Marie Stopes. Modern research suggests that none of these four constituents is so markedly reactive to oxygen as to be a particular source of danger to the coal as a whole. In other words, freedom from oxidation or deterioration during storage is not to be secured simply by choosing a coal containing a low percentage of any particular banded constituent. At the same time, however, it is undeniably true that the banded constituents show differences in their behaviour to oxidation which are not to be neglected. This is shown, for example, by the work of Burrows and Moore (" Fuel," Vol. X., p. 205), in which the investigation was conducted by measuring the temperature in a plug of coal dust during combustion—the term combustion including incipient oxidation at temperatures far below that at which visible burning occurs. It was shown that of the banded constituents vitrain has the greatest tendency to spontaneous combustion, clarain has the next greatest, while durain and fusain have considerably less tendency. From the practical man's viewpoint, the significance of this observation is that bright coals have a general greater tendency to spontaneous combustion than dull coals; but this cannot be taken as a complete generalization, since the bright coal from a certain seam may have less tendency to spontaneous combustion than the dull coal from another seam. All work on coal is complicated by the dissimilarity which exists between all coals—even when from apparently similar geological strata. Research has yet to reduce this chaos to order.

The behaviour of the banded constituents can best be explained by the behaviour of the chemical constituents separated by solution. Four types of bodies are now recognized by chemical analysis as existing in coal—namely,

Hydrocarbons.
Resins.
Ulmins.
Plant remains.

The method by which these bodies are isolated is not without significance. By extraction of coal with pyridene, the raw material is split into two portions. The portion soluble in pyridene when again extracted with ethyl ether yields a mixture of hydrocarbons and resins which for the present purpose may be regarded as similar in their behaviour. The remainder of the pyridene-soluble portion having once been dissolved evidently cannot consist of plant remains and is, therefore, classed as ulmins. The pyridene-insoluble portion consists partly of ulmins and partly of plant remains; the plant remains may be separated from the ulmins by regulated oxidation, in the course of which the ulmins can be oxidized while leaving the plant remains virtually unattacked. Slightly more vigorous oxidation results in the destruction of both types of bodies. It is clear from this method of procedure that the ulmins are easily oxidized. Indeed, Francis and Wheeler (Safety in Mines Research Board, Paper No. 28) have found that the ulmin compounds are the most readily oxidizable constituents of coal.

Each of the four banded constituents contains ulmins, but vitrain—the constituent most liable to spontaneous heating—contains more ulmins than the other banded constituents. Weathering causes a definite increase in the amount of ulmin compound present. The ulmins, therefore, are clearly oxidation products. Indeed, it is found that in the vitrain and clarain bands almost the whole of the coal substance is converted by oxidation into ulmins, while the proportion of durain and fusain so changed is less. It is a noticeable fact that highly oxygenated coals, themselves already partly oxidized, are the most susceptible to further attack. Vitrain particularly and clarain to a less degree contain but little plant remains; clarain, however may merge imperceptibly into durain which is very high in plant remains. The resins and hydrocarbons, although not particularly liable to oxidation, are fairly readily converted by oxidation into ulmins, which, in turn, are particularly reactive to oxygen; but the plant remains are considerably more resistant than other constituents of coal.

The proportion of ulmins, however, is not in itself sufficient to determine the liability of a coal to oxidation. Cases are known in which so far as can be determined by analysis, two coals contain the same amount of ulmins, yet one will be more liable to spontaneous combustion than the other. This anomaly is rendered doubly anomalous because it has been traced to the presence of plant remains. The fact is that the structure of the particles of coal must also be taken into account; and if, on account of the orientation or the quantity of plant remains, the structure is more porous, the liability to spontaneous combustion will be greater since oxygen can penetrate to the ulmins more readily.

### Influence of Physical Structure.

Consideration must evidently be devoted to the influence of the physical structure of the coal. Clearly any factor which can assist the reaction between oxygen and coal to take place more rapidly will lead to greater liability to spontaneous combustion. Spontaneous combustion, indeed, may be visualized as occurring upon the surface of the particles in the same way that reactions between gases take place upon the surface of solids—a fact shown by many bi-molecular or ter-molecular gas reactions appearing when investigated by physico-chemical methods to be, monomolecular. In this event, a body which possesses a structure consisting very largely of very minute pores similar to charcoal will be far more liable to spontaneous combustion than a body of similar composition which has not the same pore structure. Bodies which possess this structure are noteworthy for the ease with which they absorb condensable gases such as carbon dioxide or water vapour.

Coals differ in their absorption capacity to water vapour as shown by the quantity of hygroscopic moisture they contain. If a coal is allowed to air-dry under normal atmospheric conditions for some hours (say, overnight), there is left behind a certain quantity of water which varies slightly in amount with the wetness of the atmosphere, and which can only be removed by heating the coal to 100° C. or just over. This is termed the hygroscopic water or inherent moisture. Many of the best coking coals contain under 1 p.ct. of inherent moisture while non-coking coals may contain up to 10 p.ct. or even occasionally more. The author's experience is that those coking coals which con-

tain the greatest quantity of inherent moisture are the most liable to deterioration through weathering and, therefore, in all probability the most liable to spontaneous combustion. Since high content of hygroscopic moisture probably indicates the high percentage of very minute pores, this observation is readily explainable.

Another factor of importance is the size of the coal. By decreasing the size of the particles, the total area exposed for a given unit weight of coal is enormously increased. It is, therefore, essential in coal storage not to store fines if possible; or, if fines must be stored, to avoid the access of oxygen to them. Another practical reason for avoidance of fines will be given later.

Attention must here be directed to a peculiar phenomenon which has just been discovered by the staff of the Midland Coke Research Committee. Certain coals are found to improve by storage and to give superior results after several months' exposure. No details have been published as yet, although the discovery is briefly referred to by Perry ("Colliery Guardian," 1932, p. 1151). When a list of these coals is available, they will no doubt be in considerable demand for storage purposes.

### Causes of Spontaneous Combustion.

Opinions differ regarding the cause of spontaneous combustion of coal, but it has been wisely remarked that in all probability these differing opinions have been based upon experience with various types of coal. Size, moisture content, percentage of volatile matter, composition of impurities, all have their effect; but what applies to one type of coal does not necessarily hold good with another. At one time pyrites was considered to be the prime and virtually the only cause of spontaneous combustion, whereas to-day pyrites has been relegated to quite an inferior role, principally because many coals have been found liable to spontaneous combustion which did not contain any considerable quantity of pyrites. Pyrites is readily oxidized and in oxidizing evolves heat and may, therefore, assist in setting up conditions favourable to cause oxidation to spread throughout the mass of coal. The principal role of pyrites in weathering is that of a chisel, that expands and splits the coal, exposing more surfaces on which oxygen can act. There is also a difference of opinion regarding the role of moisture, some maintaining that moisture has no effect, while others maintain the contrary opinion. It is probable that moisture acts by setting up the strains on the surface of the coal, either by alternate freezing and thawing or even by alternate drying and wetting. The result is an increased surface per unit weight of coal.

The mechanism of oxidation in a coal pile is very important and obviously introduces factors of a different nature from those just described. While a knowledge of the behaviour of the coal substance to oxidation is important as a guide to which types of coal to stock, the knowledge of the mechanism of combustion in the coal heap is a guide to the method to be employed in stocking. The first stage in oxidation is the absorption of oxygen by the coal surface, a reaction leading to the evolution of a small amount of heat and occurring in a manner not yet completely understood. This oxygen absorption stage appears to cause the deterioration in the coking properties of coal. From the experiments of Wheeler and Woolhouse ("Fuel," Vol. XI., p. 55) it is seen that with the coal of lower carbon content, a degree of oxidation insufficient to affect the ultimate analysis can cause a coal of low carbon content to lose its caking power almost completely. With increasing carbon content, coals become less readily oxidized, and their caking power is only affected after an appreciable change in ultimate analysis has been effected. The yield of oil obtained on carbonization is then materially reduced.

When oxygen has been absorbed upon the surface of the coal, the chemical complex so formed breaks down, liberates moisture, carbon dioxide, and smaller quantities of carbon monoxide. This reaction results in the evolution of considerable heat which has been estimated at 90 B.Th.U. per c.ft. of air involved. Consequently, it is clear that a continuance of this reaction, if the heat is not dissipated, may soon raise the coal to a temperature of 200° C. to 250° C. at which it fires. The rate of oxidation of a coal increases considerably with increasing temperature, and is such that for each 10°-15° C. increase in temperature the rate of reaction is doubled. If oxygen comes into contact with the coal at a sufficiently slow rate, the rate of rise of temperature will be so slow that the heat is dissipated by conduction before the temperature can reach anything approaching a danger point. If, on the other hand, the oxygen is fed faster, the reaction is more intense, and the rate of rise of temperature will be rapid, even though a less proportion of the oxygen supplied will enter into combination. With increasing oxygen supply, the conditions, therefore, become more favourable to spontaneous combustion until, finally, the most favourable point is passed when the supply of air becomes so great as to take away more heat by convection than is liberated by oxidation. Clearly, therefore, coal when stored should either be protected from oxygen or should be well ventilated. Taking into account the deterioration in the gas-making qualities of coal as well as the danger of spontaneous combustion, the best policy is to prevent the increase of oxygen. Industrially proper ventilation is the more usual practice as being safer and less apt to break down through accident or carelessness.

### Size of Coal.

The size of the coal is obviously a matter of some importance. If the coal is stocked in large lumps it may be adequately ventilated without taking any special precautions, but if any considerable amount of fines are stored, the interstices between the lumps of coal are partly blocked, with the result that the air circulation is impeded. The presence of fines, as has previously been pointed out, acts in a double manner, since it also increases the surface available for oxidation. Naturally the method of handling the coal is of considerable importance, since, if the coal is loaded or stacked from a considerable height, a good deal of fines are likely to be produced, particularly if the coal is friable. Even more important than the production of fines *per se* is the avoidance of segregation, since, if the fines are localized, the surface area may be increased to a dangerous extent. Coal for stocking should preferably be in large pieces and contain no fines, but if some fines are inevitable, they should be uniformly mixed with the larger coal. The method of handling must be so chosen as to comply with these principles.

The rate of oxidation at constant temperatures decreases rapidly as time proceeds, and it is, therefore, better to leave old coal down in storage and to carbonize the fresh coal coming into the works. Care must be taken, however, that the old coal has not deteriorated to such an extent that it has lost much of its value for gas-making. In such an event the net result would be equivalent to a very large reduction in the quantity of coal stored, and might, therefore, cause considerable difficulties to the gas engineer. Many rules have been laid down for the storage of coal. Porter and Ovitz in America, for example, have stated that:

(1) Coal should not be stored in heaps of more than 12 ft. deep; nor should any point in the interior be more than 10 ft. from an air-cooled surface.
(2) If possible only lumps should be stored.
(3) Handling of the coal should be reduced to a minimum in order to avoid production of dust.
(4) Lumps and fines should be distributed on the heap as evenly as possible, care being taken that lumps do not fall down and form air passages at the bottom.
(5) The coal should be re-handled and screened after two months.
(6) External sources of heat should not be allowed near the pile.
(7) The coal after mining should be seasoned for six weeks before storing in piles.
(8) Alternate wetting and drying of the coal should be avoided.
(9) Admission of air to the interior of the pile through interstices or porous foundations should be avoided.
(10) Ventilation by pipes should not be attempted.

While all these suggestions are admirable, it may be remarked that Nos. 5 and 7 will greatly increase the cost of storage, while No. 10 is to-day frequently honoured in the breach. There is, moreover, a considerable divergence of opinion as to the total height to which coal may safely be stacked. If the coal is well mixed, packed, and rolled, a pile 20 ft. to 25 ft. in depth is reasonably safe. Generally, however, from 16 ft. to 20 ft. is considered to be high enough, while, under ordinary conditions, 10 ft. is considered as ideal.

There is the same divergence of opinion with regard to ventilation. If the coal consists of lump with little or no dust, provision of ventilating channels is wise, but if the coal is dusty these channels are a source of danger because they provide a means of entry of oxygen to the centre of the heap. Any channels made must, of course, be kept free from small coal. Lumps, nuts, and fines should be well mixed before stacking, and coal from different seams should not be mixed in the stock heap. Stacking in "cone formation" from an overhead conveyor is bad, since this method causes the fines to accumulate in one place and produces greater danger of firing.

### Temperature of Coal Stack.

Temperature records of the coal stack should be kept, and if this rises to 140°-150° Fahr. the top layers of the coal should be removed and any overheated or fired coal taken out and used. The simplest method of ascertaining

the temperature is to employ a set of ⅝ in. rods, each 5 ft. in length, with screw couplings. This pointed rod is pushed down into the heap, and one or more of the others is coupled on to it, until the desired depth is reached, and after remaining in this position for ten minutes the rods are withdrawn; the temperature of the coal may be judged by an experienced man by the feel of the rod. For exact work a thermometer must be inserted in the steel tube. Freshly mined coal is more liable to heat than coal that has been raised for some time, as recognized by Porter and Ovitz' instruction No. 7.

For the storage of smaller quantities of coal, bins or hoppers of reinforced concrete are useful. Structures of creosoted timber may last for 50 years with increasing expenditure for repairs after the first 15 or 20 years, whereas in 50 years a reinforced concrete structure will be in better condition than in the year in which it was built.

If a stack of coal has fired, considerable circumspection must be used in applying water. Ammonia liquor is useful since the ammonia gas helps to displace the air. Water should not be used except as a last resource, and, if used, should be applied in large quantities continuously, since a smaller quantity of water leads only to the formation of water gas and makes the trouble worse. When the temperature has been reduced so that the fire is extinguished, the heap should be dug out.

The most important modern methods of coal stacking are given by the British Fire Prevention Committee which has laid down the following rules:

(*a*) Stacks should not be higher than 10 ft.
(*b*) Perforated iron or earthenware pipes 3 to 4 in. in diameter should be built into the coal mass vertically, with the lower ends at varying heights above ground. One pipe per 300 sq. ft. of surface will suffice (contrary to Porter and Ovitz, No. 10).
(*c*) Maximum thermometers should be lowered occasionally through these pipes to ascertain temperatures at different levels.
(*d*) If wet, very small, or impure coal is received it should be dumped around the edges of the stack so that air can circulate around it, and no other coal should be placed on top.
(*e*) Avoid external sources of heat, such as hot pipes through the coal or underground.
(*f*) Allow no fluid to leak on to the coal store.
(*g*) If the temperature rises to 35° C. remove the top layers and watch the heap carefully; use the coal as soon as possible.

### Dealing with Fire.

In case a fire has started:

(1) The fines should be disturbed as little as possible.
(2) Water should be applied to the seat of the trouble only, especially when the coal is in a confined store, otherwise spontaneous ignition may occur later.

The effect of storage on all coals, as has been pointed out previously, is to cause weathering with a deterioration in the gas-making properties, with the exception of the class of coals mentioned previously, in which the first few months of weathering actually causes an improvement in quality. Clearly the ideal method of storing coal must prevent spontaneous combustion and should also prevent, or at least minimize, the deterioration just mentioned. It has been stated that during a period of nine months, coals lose from 2-10 p.ct. of their water when exposed to the weather, while after a few months' exposure they reach a condition of stability. The experiments of Parr and Hamilton, however, show that coal stored under water for a long period does not deteriorate in any way. Storage under water involves the use of a more expensive stacking ground, it also involves drainage of the coal, after it has been dredged out of the water, and subsequently carbonization of somewhat wet coal. If, however, nuts or larger material is stacked, this latter disadvantage is almost eliminated since these sizes of coal drain rapidly. Nevertheless, it would probably be preferable to store slack under water. Storage under water would then have the dual advantages that the cheapest variety of coal could be stored, and that the coal would not deteriorate in any way. There is much to recommend this method and particularly where a gas-works is situated in a district, such as Derbyshire, where the nearest coal is easily oxidizable. The extra capital expense might well be repaid by the decreased cost of stored coal over very many years.

# A New Coin Collectors' Truck

### Designed at Redditch

We have been favoured by Mr. C. F. W. Rendle, Engineer of the Redditch Gas Company, with the accompanying illustration and description of a novel form of coin collectors' truck. This was designed by Mr. Rendle, and, in fact, the original body shown was made at the Redditch Gas-Works.

The body, 3 ft. by 2 ft. by 1 ft. 3 in., is of sheet steel riveted to light pressed steel angles, and is partitioned into five compartments. Four are approximately 12 in. cubed and are used, one by each coin collector, to receive the coppers (or silver) in bags, and the fifth (2 ft. by 1 ft. by 1 ft. 3 in.) is used for a stock of coin bags, collectors' raincoats, &c.

The chassis, made by the Enfield Cycle Co., Ltd.—who, incidentally, are the Gas Company's largest consumers—is of tubular steel brazed into standard motor cycle or sidecar fittings, and is mounted upon standard pneumatic tyred, ball-bearing motor cycle wheels with 1 in. diameter spindles. Compensated internal expanding brakes, operated by a hand grip lever, render safe the transit of the loaded conveyance on any hill—the normal load approximates 5 to 6 cwt.—and the use of ball-bearing wheels and 3¼ in. pneumatic tyres enables the loaded truck to be hauled easily by a lad.

The conveyance is exceedingly strong and is free from fire risk, while its neat appearance enhances its value as a permanent advertising medium. It will be observed that the Company are using it as such.

The Enfield Cycle Company are anxious to commercialize the production of the vehicle if there is a call for it, and at Mr. Rendle's suggestion contemplate making also the same chassis fitted with a body suitable for the use of gas fitters and service layers, and, in addition, a smaller coin collecting vehicle for use by undertakings whose practice

calls for a smaller body, where, perhaps only one or two collectors operate, with more frequent deposits at banks on the district.

# Gas Distribution in Sydney

[Extracts, from the "Australasian Engineer," of a paper read by Mr. T. F. WAUGH (Distribution Engineer to the Australian Gas Light Company) before the Engineer Surveyors' Association (Australasia), Inc., on May 4 last]

The Australian Gas Light Company, which has been more or less linked with the growth of Sydney, was incorporated in 1837 and the first consignment of machinery arrived from England in May, 1839; gas being first supplied to the town on May 24, 1841, in connection with the celebration of the Queen's birthday. As there was no municipal body in Sydney at that time, very little street lighting existed, but in 1842 the Corporation of Sydney was established and four years later many of the city streets were lit by gas.

### Historical Progress.

The population of Sydney was then about 25,000, and the capacity of the two gasholders 45,000 c.ft. each, which the Company considered would be sufficient for the requirements of Sydney for many years to come. In 1865 the total storage of the holders had been increased to 295,000 c.ft. To-day the total capacity of the various holders is 27,100,000 c.ft.

The price charged for gas in 1841 was 25s. per 1000 c.ft. By 1913 it had been reduced to 3s. 6d. per 1000 c.ft. About this time the first Gas Act came into operation, and since then the price has fluctuated from time to time, to 5s. 6d. per 1000 c.ft. as charged to-day.

As the growth of Sydney was very rapid, continual extensions to the works and mains were made until it was found necessary to erect new works at Mortlake as the original works at Kent Street, in the City, were incapable of further extension, and in 1886 the Mortlake works were put into operation and a 36-in. main was laid from Mortlake to Five Dock and later continued to the City.

Although as regards output of gas the Australian Gas Light Company, compared with several other large companies in the British Empire, is seventh on the list, in mileage of mains, it is second, this fact being due to the scattered nature of Sydney, which makes the distribution of its public utilities a very costly matter. The Company are proud of the fact that they supply the cheapest gas in Australia, and one of the difficulties in the way of selling it still cheaper is the enormous area (250 sq. miles) over which it is distributed.

### Extending the System.

The 36-in. main, just mentioned, was laid from Mortlake to Sydney; in 1891 an 18-in. main was laid from Mortlake to Parramatta, which district had previously been supplied by the Parramatta Gas Company (the Parramatta Company being purchased by this Company in 1890). As soon as this main was completed, the Parramatta works were closed down.

During the same period the Company commenced laying mains to supply the districts of Ryde, Gladesville, and Hunter's Hill, and in 1899 the Company's mains were extended to supply the areas of Gordon, Hornsby and Roseville; the Illawarra district was added to the area of supply in 1902.

Up to this point all the gas was supplied by the low-pressure method.

About this time the Company began to experience considerable difficulty in giving an adequate supply to the outlying areas, and boosters were erected at Mortlake. Station governors were fitted along the line of main at various points to control the pressure, and as soon as these were completed the station governor at Mortlake was removed so that the supply, instead of being controlled from Mortlake, was controlled along the line of main at the most suitable points; the maximum pressure at Mortlake was 17 in. of water, or approximately $\frac{3}{5}$ lb. per sq. in. As the area of supply grew, and more and more consumers were added, this pressure was found to be inadequate and larger machines, capable of sending out a greater quantity per hour at a greater pressure, were installed at the works.

The boosters were driven by Parsons turbines of 500 h.p. and were capable of sending out 1 million c.ft. per hour against a pressure of 100 in., or approximately 3½ lbs. per sq. in.; but Sydney still continued to grow very rapidly and these machines soon became incapable of delivering the quantity of gas required. Larger machines were again installed, capable of sending out 2 million c.ft. per hour against a pressure of 200 in., approximately 7¼ lbs. per sq. in.; they were 1300 h.p. at 3600 r.p.m.

As population growth continued, the trunk mains became considerably overtaxed, and at this time the maximum hourly output had reached the neighbourhood of 3,500,000 c.ft. This quantity, however, was only required for a short time, and so the mains were not being made the best use of, because, at the rate of 3,500,000 c.ft. per hour, for 24 hours we could cope with a maximum daily demand of about 84 million c.ft., whereas the actual daily demand was in the neighbourhood of 18 million c.ft.

### District Holders.

This immediately suggested the erection of district holders which would allow us to send the gas out from the works during the slack periods of the day, or night, and so have the gas at the points where it was required when the demand was greatest. As a result, district holders were erected, the first one being at Gordon, and boosters were also erected so that the gas could be pumped out to the district as required. Later on, holders were erected at Alexandria and Canterbury, the capacity of each being 3,800,000 c.ft. A boosting plant consisting of five 280 h.p. crankless engines and boosters, each machine being capable of sending out 500,000 c.ft. of gas against a pressure of 200 in., was installed at Alexandria, and a similar plant, consisting of two machines, is in use at Canterbury.

The engines are eight cylinder, the bore 8½ in. and the stroke 9 in. and the maximum revolutions are 700. One great advantage, from our point of view, of using this type of engine is that whereas the ordinary gas engine has only a very small permissible variation of speed, these engines can be run from 150 to 750 revs. per min. The gas consumption under full load is 14 c.ft. per h.p. per hour, which is an excellent performance.

Apart from the application of the Michell pad to a slant, the general features of the engine are similar to any internal combustion engine, the usual inlet and exhaust valve being provided, ignition being by high tension coil and distributors supplied with current from a 12 volt accumulator, which is automatically charged by a dynamo driven by the engine.

The oil supply to the engine and booster is from two separate tanks, one for each unit, the oil being pumped by individual pumps and delivered to the engine and booster under pressure. The oil drains into a sump, from which it is pumped back to the tanks through coolers. There are one or two interesting safety devices on the ignition system. On the supply of oil to both the booster and the engine, there is a small cylinder containing a piston, which, under pressure, makes electrical contact. If the pressure of oil fails on either the engine or booster, naturally the piston falls, so breaking the contact and stopping the engine automatically.

The engines are not governed, because of the nature of the work they have to perform necessitating considerable variations in speed, but a small maximum speed governor is fitted, which breaks a circuit in the ignition system as soon as the speed exceeds any given number of revolutions over 700; in actual practice the governors are set to cut out at 800 revs. per minute.

The Michell thrust bearing depends for its success upon the application of a wedge shaped film of oil between the pad and the bearing surface; precisely the same method is used in the application of the pads to the slant. The clearance between the pads and the slant is set at three-thousandths of an inch, and as there is no metallic contact between the pad and the slant, there can be no wear other than that caused by the friction of oil, which is negligible.

These machines were the first commercially produced engines and boosters of this size and power in the world, and, as may be imagined, a considerable amount of trouble developed in the early stages of their running, but gradually individual troubles were eliminated until to-day I am confident that we have in these machines a unique plant which is also the largest individual boosting plant of its kind in the world.

The cooling of engines of this type presents quite a problem and after considering various types, it was decided to develop something a little different from that generally used.

### Cooling the Engines.

When the engines were being built, I felt that, as the operator would possibly be concerned with maintaining pressures and output of gas, some visible means of ascertaining that the cooling water was being supplied to the engines was necessary, so I suggested to the National Gas Engine Company that gravity fed water with a break at the inlet to the engine, or the outlet, should be provided, and it was finally decided to make the break in the supply at the outlet to the engines. As the exhaust pipes are above ground, it was, of course, necessary to cool these,

which meant that the water flowing into the hot well would be at a very much greater temperature than when it left the engine; and as this water had to be pumped back to the supply tank, the first difficulty arose, as the pumping of water which is very nearly at boiling point presents an unusual problem. In order to overcome this, coolers were placed between the outlet of the engine and what is normally known as the hot well. These coolers consist of a square box with a grid across the middle, the top half being filled with Lessing rings. At the side of the bottom portion of the box, an air inlet is provided so that air from a fan can be driven upwards through the rings.

At the bottom of the box the usual outlet is provided, and at the top the water is passed in over a series of weirs, splitting it up into a number of fine streams, and it then percolates through the rings against air which has been driven upwards by the fans. After the water has passed through the rings, it falls to the bottom of the box and runs out from the outlet into the hot well, then being pumped back by a pump driven by each individual engine to the supply tank, whence it falls by gravity to the engine and so on through the process again. This system has worked admirably, and the loss of water is very slight, most of it being caused by the updraught of air through the water as it is going through the cooling boxes.

Referring again to the actual distribution, the whole of the gas is manufactured at the Company's works at Mortlake and is transferred from there by means of the boosters, through the mains, during the night, to the various holder stations at Gordon, Canterbury, and Alexandria; during the day, as gas is required, it is sent out from Mortlake and from these three stations simultaneously. The three outlying stations, Gordon, Alexandria, and Canterbury, are all approximately the same distance from Mortlake—viz., 6 miles—which allows us to transfer the original point of supply from Mortlake to a distance 6 miles farther out. By this means we have been able to maintain the supply without exceeding a pressure of 200 in. If the supply were wholly from Mortlake, we should have had to increase the pressure at Mortlake by a very considerable amount. This, of course, would have resulted in increasing the leakage, which cannot altogether be avoided from mains and services.

This system has meant a better utilization of the mains than was possible under the old system of holder supply from Mortlake to the whole of the area. At the present time the Mortlake boosters are capable of supplying the whole of the area for the greater portion of the 24 hours, but during the peak loads, say, from 5 to 6 p.m., and particularly midday Sunday, the boosters at Gordon, Alexandria, and Canterbury take up their share of the supply, the gas having been put into the holders during the previous night.

### The Distribution System.

The mains are all high pressure, and generally consumers are not supplied directly from them, but almost every street in the area has low-pressure mains laid in it. These mains are kept at a very nearly constant pressure by means of automatic governors which supply the gas, as required, from the high-pressure to the low-pressure main. There are some 198 of these governors in pits in the ground supplying from the high to the low pressure mains, placed in positions in the districts where most use can be made of them. They are set to give varying pressures according to the altitude of the area that they supply, so that the whole area is kept balanced in regard to gas pressure.

The system which is now in use has been developed over the last 20 years, and, during that development, it was apparent that, by the use of high pressure, very much smaller mains, involving less capital expenditure, could do the work of larger mains supplying low-pressure gas. Several areas which have recently been added to the Company's line of main have been reticulated with small mains carrying high-pressure gas. A typical example is that of Fairfield, Canley Vale, Cabramatta, and Liverpool. Some 10 miles of 4-in. high-pressure welded steel mains were laid to Liverpool from an 18-in. main close to Parramatta, and boosters capable of compressing the gas up to 30 lbs. per sq. in. were erected at Parramatta. The gas was forced through the small main to Liverpool, and the old Liverpool works, which had been purchased by the Company, were closed down. The supply of gas was very much more satisfactory under these conditions than under the old method of supply.

In order that this high-pressure gas may be used in domestic appliances which are designed to burn gas at low pressure, it is necessary to reduce the pressure by means of a small governor to some pre-determined amount. The advantage of this system is, from the consumer's point of view, that he gets an absolutely constant pressure at the appliance, which results in economy to the consumer and generally more uniform results.

At June 30, 1931, the Company was supplying 247,267 consumers by means of 2018 miles of main, together with 2641 miles of service pipe. The quantity of gas sold for the year was 6,607,714,000 c.ft.

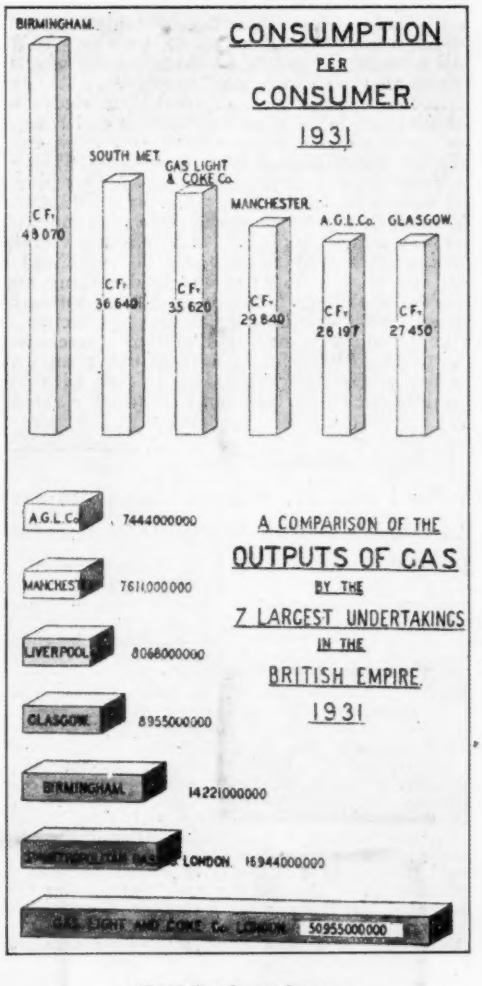
### The New Gas Unit.

Before concluding, I would like to say something about the new "gas unit." Up to the present, gas has been sold at so much per 1000 c.ft., but, in the very near future, it will be sold by the "gas unit." This "gas unit" contains precisely the same number of British Thermal Units—viz., 3412—as the electrical unit, or Board of Trade unit. A direct comparison, on the basis of cost, will, therefore, be possible between gas and electricity, or between all fuels sold by the Board of Trade unit.

For example, 1 c.ft. of gas (as supplied by the Australian Gas Light Company) contains 550 B.Th.U., so that the quantity of gas required to equal one Board of Trade unit (or one "gas unit") is 3412 divided by 550, which equals 6·2 c.ft. At 5s. 6d. per 1000 c.ft.—the Company's present selling price of gas—6·2 c.ft. of gas costs 0·409d.

The comparison between electricity and gas is, therefore: 1 unit of electricity (domestic power rate) costs 1¼d.; 1 unit of gas costs 0·409d. These figures are based on 100 p.ct. efficiency, so that they require to be adjusted according to the efficiency of the appliances used.

Gas used for industrial purposes is subject to a scale of discounts ranging from 5 to 35 p.ct., based upon the quantity used. The average discount given for all industrial gas is approximately 20 p.ct. Therefore the average price of a unit will be 0·328d., the maximum price being 0·3886d. and the minimum being 0·266d. per unit. I believe that the minimum charge for electricity is ½d. per unit, which is given for continuous hot water services and also for power if used on full load for 24 hours per day.




**World Gas Comparisons.**

The above diagrams are practically self-explanatory. The upper figure gives the consumption per consumer of the seven largest gas undertakings in the British Empire, in which it will be seen that the Australian Gas Light Company, Ltd., stands fifth with 28,197 c.ft. The lower illustration shows comparative outputs of the same companies, the A.G.L. being seventh, though, had it not received the setback of the present depression, it was just about to jump to fourth place.

# South Suburban Company's Co-Partnership Festival

A very large number of employees and their relatives were present at the annual Co-Partnership Festival of the South Suburban Gas Company held on Saturday, July 23, at the Crystal Palace. Among those present were Dr. Charles Carpenter, Chairman of Directors, Mr. B. R. Green (Deputy Chairman), Mr. Harold Gundry (Director), Mr. Wilfrid Wastell (General Manager), Mr. F. G. Gorman (Chief Engineer), Mr. T. Brown (Secretary), and Mr. C. J. Carter (Employee Director).

The afternoon's programme was devoted to an excellent entertainment in the Palace Theatre, and during an interval in this the Chairman took the opportunity of saying a few words of welcome to the co-partners of the Company assembled.

### Dr. Carpenter's Address.

As most of them knew, said Dr. Carpenter, the Co-partnership Scheme which they were there that day to celebrate was founded some 37 years ago, and for very different conditions from those which existed to-day. It was a voluntary effort springing from an intense desire on the part of the Directors of the Company at that time to do something to put on a more satisfactory and more humane footing the relationship between capital and labour. In those days that relationship was not of the harmonious character of that to which they were to-day accustomed. It was a gift on the part of the Company, and its object was to raise the employees to a position right beyond, he thought, that which employees generally visualized, since it was tantamount to making them partners in the Undertaking.

To-day he was not so certain that co-partnership would be considered as urgent, because in those intervening 37 years much had happened to prove how false was the foundation upon which capital had been erected. It did not take into account humanity so much as the effectiveness of working and the utilization of machinery. To-day conditions were so different because of the knowledge that no undertaking could make progress unless it had the goodwill and good feeling of all those whose duty it was to work the machines which capital had erected.

As in those days the idea was to give something which it was thought was due to labour, the circumstances to-day were changed, and it was now the duty of labour to do its part and play a more important one than was visualized or considered necessary 37 years ago. They realized to-day that they had in the works of the Undertaking adequate and suitable machinery for making gas economically and distributing their products from the producing centre. They recognized that they had efficient machinery for bringing to the houses of their consumers an adequate supply of gas. But they were face to face with competition of a different character from that which existed in the past, and it behoved all co-partners to recognize these changed conditions.

### The Co-Partner's Duty.

It was not a question to-day, continued Dr. Carpenter, of paying an adequate or agreed rate for an agreed daily expenditure of hours of labour. Something more was needed if they were to maintain the success they had already achieved and to ensure its continuance in the future. And what they desired was that every co-partner in the Undertaking should recognize the seriousness and importance of the part he had to play in making up one entire and successful whole. What he would ask them to do that day was to realize that their work for the Company did not cease when the whistle blew or the bell rang at the conclusion of the normal day's work; but he would ask them, not only for the sake of the Company but for their own sake as shareholders as well as dependants upon the Company for their own welfare and that of their wives and families, to forget the normal routine and realize that if they were going to carry out their co-partnership—and co-partnership not in substitution for but in addition to their daily work and remuneration—if they were going to justify their continuance in the co-partnership, to say to themselves, "What can I do—How can I help forward these aims and bring home to those who are unaware of them the extent to which they can avail themselves of the Company's services?"

In return for what the Company did in bringing about the possibility of regular employment—in return for the provision which the Company made in regard to the future of their employees—the employees must do all they could to render the Undertaking not subject to be shaken by every adverse wind that blew, but to enable the Company to stand up, a solid Undertaking and a solid rock. They wanted something like the attention which was given round the coasts of England to the ceaseless battling of the waves against their shores. They did not want any opportunity for that sea to weaken their defences or do anything to indicate a lack of strength and stability of that organization which they called the South Suburban Gas Company, and in this respect more than in any other they needed the aid of every employee. They wanted them to help throughout the whole of their working lives—not only when work finished but when recreation began; for true recreation was in their labours.

"I only want to say," said Dr. Carpenter in conclusion, "on behalf of my colleagues and myself how much we welcome you here to-day, and how much we appreciate the harmony which has brought you together and the fellowship which all your meetings have indicated. We hope that this will be but one of many examples of happy days in the future."

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## Watford and St. Albans Gas Company.

### Amalgamation with Welwyn and Hatfield.

An Extraordinary General Meeting of the Watford and St. Albans Gas Company was held on July 19 at the Company's chief showrooms, 149, The Parade, for the purpose of approving the agreement for the transfer of the Welwyn and Hatfield Gas Company, Ltd., to the Watford and St. Albans Company.

Mr. Frank H. Jones (Chairman and Managing Director) presided, and was supported by Mr. Henry Brown (Deputy-Chairman), Mr. W. S. Coles, Mr. R. T. Kent, Mr. C. Chambers, Mr. H. N. Lipscomb, there also being present Mr. G. Wilks (Secretary nd Commercial Manager), Mr. T. S. Godwin (Watford Works Manager), Mr. T. C. Battersby (St. Albans Works Manager), Mr. H. C. Dunbar (Hemel Hempstead Works Manager), Mr. Henry F. H. Jones, and several stockholders of the Company.

The Chairman said that it was three years since he had asked the stockholders to agree to the amalgamation of the St. Albans Gas Company. Since then they had amalgamated with Elstree and Hemel Hempstead, and to-day he wanted them to agree to the amalgamation of the Welwyn and Hatfield Gas Company, Ltd. He stated that it was a small concern, about one-fifteenth of the size of the Company's area as it existed to-day, but it would be of benefit to the Company, as its area was contiguous to the St. Albans area, and this facilitated the supply of gas in bulk from the St. Albans Works to that district. They were asked to agree to an amalgamation very much on the lines as had taken place with St. Albans, Elstree, and Hemel Hempstead, and which he felt sure would also be of benefit to both the consumers and the stockholders.

The Chairman stated that since he had been connected with the Watford Company the sales in the Watford area alone had increased ten times, so that it was not altogether owing to amalgamations the Company had grown to its present size. The shareholders of the Welwyn Company were to be given stock of the Watford and St. Albans Gas Company to produce an equal income to that received on their present holdings. The amounts owing on mortgages and debenture bonds would become a charge on the Watford Company, and would be subject to the same terms and conditions on which they were at present held. The employees taken over would be eligible for membership of the Watford Company's co-partnership and pension schemes, which were proving of great benefit to the present employees. Compensations were to be paid to the Directors and officials of the Welwyn Company for loss of office.

Resolutions in the following terms were then proposed by the Chairman and Managing Director, seconded by Mr. Henry Brown, and carried unanimously.

1. That the provisional agreement dated June 27, 1932, and made between the Welwyn and Hatfield Gas Company, Ltd., of the one part, and the Watford and St. Albans Gas Company, of the other part, which provides for the transfer of the undertaking of the Welwyn and Hatfield Gas Company, Ltd., to the Watford and St. Albans Gas Company, and (*inter alia*) for payment of compensation for loss of office being made by the Watford and St. Albans Gas Company to the Directors and certain officers of the Welwyn and Hatfield Gas Company, Ltd., and a copy of which agreement is submitted to this meeting, be and the same is hereby approved subject to such alterations (if any) as Parliament or the Board of Trade may think fit to make therein and the Directors of the Watford and St. Albans Gas Company shall accept; and subject also to the insertion in the Special Order to be applied for, to give effect to the agreement of a provision that the price charged by the Watford and St. Albans Gas Company to consumers within the limits of supply of the Welwyn and Hatfield Gas Company, Ltd., may exceed the price for the time being charged in respect of gas so supplied within the Watford district,

as defined in the Watford and St. Albans Gas Order, 1929, by not more than 4 1/10d. per therm, and that, for the purpose of ascertaining the rate of dividend payable on the ordinary stock of the Watford and St. Albans Gas Company, the price charged in respect of gas supplied by the Watford and St. Albans Gas Company shall be deemed to be the price from time to time charged in respect of gas supplied by the Watford and St. Albans Gas Company within the Watford district aforesaid.

2. That application be made to the Board of Trade for a Special Order under the Gas Undertakings Acts, 1920 and 1929, to give effect to and confirm the said agreement.

## Corporation Undertakings' Results.

**Abertillery.**

The annual report of the Abertillery Gas Undertaking shows that the net total income for the year to March 31 amounted to £23,885, and the expenditure to £19,098, showing a gross profit of £4787. After providing net revenue charges, &c., there is a net profit of £960. The report states the results are very satisfactory, and undoubtedly due to the progressive policy of the Department, which, though losing large customers to electricity, had more than made up for the loss by an active extension of apparatus for cooking, heating, &c. The sales of gas were increased by 3,405,900 c.ft. (3·8 p.ct.) for the year.

**Coventry.**

The Coventry Gas Undertaking accounts for the year ended March 31 last show an available surplus of £15,716. This the Committee recommend shall be applied in payment of the following items of capital expenditure: New meters, £6763; new mains and services, £8371; and distribution station, £580. The gross profit amounted to £105,379, as compared with £83,419 the previous year. There was a reduction of £3000 in income from sales through ordinary meters, largely due to trade depression, but this was offset by an increase of £12,700 in prepayment sales due to an increase in price from last October. The cost of manufacture show a large decrease, due to a decrease of 4·74 p.ct. on the amount made and the increased yield per ton as the result of a larger proportion being made in the vertical retort installation.

**Nelson.**

The expenditure on revenue account during the year has been £79,249, or £547 less than the estimated expenditure; while the income has been £113,354, or £4809 less than the sum estimated. The result is a gross profit of £34,105, and a net profit of £10,149. During the year 25,857 tons of coal have been carbonized; all at the Brierfield Works. The total quantity of gas made during the year has been:

| | C.Ft. |
|---|---|
| Coal gas made at Nelson Works | *Nil* |
| Coal gas made at Brierfield Works | 565,825,000 |
| Carburetted water gas | 12,921,000 |
| Total | 578,746,000 |

The gross income from residuals and bye-products has been £18,278, as compared with £14,581 obtained the previous year, and after deducting all the expenses of manufacture and handling of same, the net income from this source amounts to £11,328, as compared with £12,266 last year. The total quantity of gas delivered during the year has been 578,542,000 c.ft., being an increase of 4,750,000 c.ft., or 0·88 p.ct. on the quantity delivered last year. The unaccounted-for gas has increased by 12,255,405 c.ft., and now stands at 6·84 p.ct. of the total quantity of gas made, as compared with 4·26 p.ct. last year. There are now a total of 17,399 consumers; 6062 of these have ordinary meters, and 11,337 are provided with prepayment meters; being an increase of 40 consumers during the year.

## Metropolitan Gas Companies' Testings.

The Gas Referee's report on the official testings for the past quarter gives the following average calorific values for the gas supplied by the Metropolitan Companies named.

**Commercial Gas Company.**—502·5 B.Th.U. (declared calorific value, 500 B.Th.U.).

**Gas Light and Coke Company.**—503·5 B.Th.U. (declared calorific value, 500 B.Th.U.).

**South Metropolitan Gas Company.**—561·7 B.Th.U. (declared calorific value, 560 B.Th.U.).

**South Suburban Gas Company.**—563·2 B.Th.U. (declared calorific value, 560 B.Th.U.).

**Tottenham and District Gas Company.**—502 B.Th.U. (declared calorific value, 500 B.Th.U.).

**Wandsworth and District Gas Company.**—501·2 B.Th.U. (declared calorific value, 500 B.Th.U.).

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*Quotations submitted.*

# GAS MARKETS & MANUFACTURES

## Stock Market Report.

**[For Stock and Share List, see later page.]**

Cheerful conditions prevailed on the Stock Exchange again last week. British Funds continued to rise in value, and there was a further heavy demand for the non-assented War Loan; but as a very large proportion of the Loan has now been converted, the amount of this variety available has been considerably reduced, with the result that the price hardened on Saturday to 101¾. Among other features was a welcome rally in Home Railway preference stocks, due to the Southern Company's announcement that the full interim dividends would be paid on its preference issues, while Oils and the shares of gold-producing companies also displayed signs of increasing activity.

Gas stocks and shares were again heavily supported, an unusually large number of transactions being recorded. It is evident that the strength of the market is tempting some holders to dispose of their investments, for a number of stocks which are very rarely obtainable have lately been coming into the market, though these have found ready buyers at top prices. Subject to the rates of dividend being maintained, there is every justification for the belief that with the change in investment values the present prices will continue.

Still further improvements were recorded last week, mainly among ordinary and preference issues. Gas Light units, for which a large number of buying orders were put through, rose 6d. to 24s., and Newcastle units gained a similar amount to 22s. on the local Exchange, the London price being only 3d. less. South Metropolitan was quoted 1 higher at 120½, and South Suburban 2½ points up at 118½. The largest increases were in Hastings and St. Leonards 5 p.ct. with a gain of 12½ points to 125; Winchester Water and Gas 5 p.ct. with 10 points to 102½, the stock changing hands at 105; and British ordinary which hardened 7 points to 137.

Interim dividend announcements were made last week by the South Metropolitan and Commercial Companies, both of which are distributing 2½ p.ct. This is the same rate paid by the former Company, but compares with 3 p.ct. (actual) paid by the Commercial Company for the corresponding period 1931.

## Current Sales of Gas Products.

### The London Market for Tar Products.

LONDON, *July* 25.

There are no changes to report in the prices of tar products, which remain as follows:

Pitch, 95s. per ton f.o.b.

Creosote, 3½d. to 5d. per gallon f.o.b., according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 6d.; pure benzole, about 1s. 8d.; 95/160 solvent naphtha, 1s. 4½d. to 1s. 5d.; and pyridine bases, 3s. 9d. to 4s.—all per gallon naked at makers' works.

### Tar and Tar Products in the Provinces.

*July* 25.

The average prices of gas-works products during the week were: Gas-works tar, 34s. 6d. to 39s. 6d. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 9d. to 1s. 10d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2½d. to 3d.; low gravity, 1¼d., Scotland, 2¼d. to 3d. Heavy oils, in bulk, North, 4¾d. to 5¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 8d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2¼d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

### Tar Products in Scotland.

GLASGOW, *July* 23.

The week under review has been very quiet owing to the holidays. Prices are mainly steady with stocks within reasonable bounds.

Crude gas-works tar.—Actual value is 57s. 6d. to 62s. 6d. per ton *ex* works.

Pitch.—Production is low and values remain at 85s. to 90s. per ton f.o.b. Glasgow for export, and 90s. to 95s. per ton *ex* works in bulk for home trade.

Refined tar to Ministry of Transport Specification.—Throughput is disappointing, and quotations are round 4¼d. to 4½d. per gallon f.o.r. in buyers' packages.

Creosote oil.—This continues to be a steady market. B.E.S.A. Specification is 3¼d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon—all f.o.r. in bulk.

Cresylic acid.—Orders are scarce with prices irregular and stocks on the high side. Pale, 97/99 p.ct., is 1s. 0½d. to 1s. 1½d. per gallon; dark, 97/99 p.ct., 11½d. to 1s. 0½d. per gallon; and pale, 99/100 p.ct., 1s. 2½d. to 1s. 3½d. per gallon—all f.o.r.

Crude naphtha.—Available supplies fetch 4½d. to 5d. per gallon, according to quality.

Solvent naphtha.—Little interest is being taken, and values are easy at 1s. 2d. to 1s. 3d. per gallon for 90/160 grade, and 11d. to 1s. per gallon for 90/190 grade.

Motor benzole.—Value is unchanged at 1s. 2½d. to 1s. 3½d. per gallon in bulk quantities *ex* works.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon; and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

### Benzole Prices.

These are considered to be the market prices for benzole at the present time.

| | s. d. | | s. d. | |
|---|---|---|---|---|
| Crude benzole | 0 8½ | to | 0 9 | per gallon at works |
| Motor ,, | 1 3½ | ,, | 1 4 | ,, ,, ,, |
| Pure ,, | 1 7 | ,, | 1 8 | ,, ,, ,, |

## Trade Notes.

### Newton Chambers & Co. to Manufacture Chemical Plant.

We learn that Messrs. Newton Chambers & Co., Ltd., are extending their activities to include the manufacture of a wide range of chemical plant and apparatus. They have appointed Mr. L. A. Mitchell, Managing Director of Messrs. L. A. Mitchell, Ltd., Chemical Engineers, of 37, Peter Street, Manchester, as their technical representative for the sale of chemical and bye-product plant. Several specialized chemical plants which are at present only manufactured abroad will be among the early productions of the firm.

### Henry Wells Oil Company, Ltd.

With the permission of the Board of Trade, the makers of "Germ" oils have changed their name from Henry Wells Oil Company, Ltd., to "Germ Lubricants, Ltd." During the first six months of this year, the sales of "Germ" oils increased 17 p.ct. over the sales for the corresponding period of last year, and the sole makers and suppliers are changing their name so that it will be associated more closely with their chief product. There has been no alteration whatever in the management of the business, which was commenced by Mr. Henry M. Wells (the present Chairman) in 1898. The Company's works are at Salford, Manchester, and their Head Offices at Salisbury House, London, E.C. 2.

## Contracts Advertised To-Day.

**Coal.**

The Teignmouth Urban District Council invite tenders for the supply of gas coal. [Advert. on p. 210.]

**Painting.**

The Slough Gas and Coke Company invite tenders for the painting of street lamps and columns. [Advert. on p. 210.]

# STOCK AND SHARE LIST.

**Official Quotations on the London and Provincial Stock Exchanges.**

**[For Stock Market Report, see earlier pages.]**

| Issue | Share. | When ex-Dividend. | Dividends. Prev. Hf. Yr. | Dividends. Last Hf. Yr. | NAME. | Quotations. July 23 (Provincial Exchanges July 22.) | Rise or Fall on Week. | Transactions. Lowest and Highest Prices During the Week. |
|---|---|---|---|---|---|---|---|---|
| £ | | | % p.a. | % p.a. | | | | |
| 1,551,868 | Stk. | Apl. 4 | 7½ | 7½ | Alliance & Dublin Ord. ... | 108—118 | −2 | 111½—117½ |
| 374,000 | ,, | July 4 | 4 | 4 | Do. 4 p.c. Deb. ... | 78—83* | ... | ... |
| 557,655 | ,, | Mar. 14 | 7 | 7 | Barnet Ord. 7 p.c. ... ... | 135—145 | ... | ... |
| 300,000 | 1 | Apl. 29 | 1/4½ | 1/9⅜ | Bombay, Ltd. ... ... | 15/—20/- | ... | ... |
| 177,750 | Stk. | Feb. 29 | 9 | 9 | Bournemouth sliding scale | 180—190 | ... | ... |
| 550,050 | ,, | ,, | 7 | 7 | Do. 7 p.c. max. ... | 137—147 | ... | ... |
| 439,160 | ,, | ,, | 6 | 6 | Do. 6 p.c. Pref. ... | 125—130 | ... | ... |
| 50,000 | ,, | June 20 | 3 | 3 | Do. 3 p.c. Deb. ... | 70—75 | ... | ... |
| 162,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 90—95 | ... | ... |
| 210,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 115—120 | ... | 118½—120 |
| 357,900 | ,, | Mar. 14 | 7½ | 7½ | Brighton, Hove, & Worthing 6 p.c. Con. ... | 135—145 | ... | 144½ |
| 540,000 | ,, | ,, | 6½ | 6½ | Do. 5 p.c. Con. ... | 120—130 | ... | 126 |
| 195,500 | ,, | ,, | 6 | 6 | Do. 6 p.c. B Pref. | 125—135 | ... | 132—133 |
| 1,287,500 | ,, | Feb. 29 | 5 | 5 | Bristol 5 p.c. max. ... ... | 109—111[a] | +2½ | ... |
| 120,420 | ,, | June 20 | 4 | 4 | Do. 1st 4 p.c. Deb. ... | 85—90[a] | ... | ... |
| 217,870 | ,, | ,, | 4 | 4 | Do. 2nd 4 p.c. Deb. ... | 85—90[a] | ... | ... |
| 328,790 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... ... | 115—120[a] | ... | ... |
| 855,000 | ,, | Apl. 4 | 7 | 8 | British Ord. ... ... ... | 132—142 | +7 | 135—136 |
| 100,000 | ,, | June 20 | 7 | 7 | Do. 7 p.c. Pref. ... ... | 120—130 | ... | ... |
| 120,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 87—92 | ... | ... |
| 450,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 105—115 | ... | ... |
| 160,000 | ,, | July 4 | 5 | 5 | Cambridge 5 p.c. Deb. ... | 105—115 | ... | ... |
| 100,000 | 10 | May 23 | 6 | 6 | Cape Town, Ltd. ... ... | 7½—8½ | ... | ... |
| 100,000 | 10 | Apl. 29 | 4½ | 4½ | Do. 4½ p.c. Pref. ... | 6—7 | ... | ... |
| 150,000 | Stk. | June 20 | 4½ | 4½ | Do. 4½ p.c. Deb. ... | 80—90 | ... | 87—88 |
| 626,860 | ,, | Feb. 15 | 6 | 6 | Cardiff Con. Ord. ... ... | 100—105 | ... | ... |
| 237,860 | ,, | July 4 | 2½ | 5 | Do. 5 p.c. Red. Deb. | 105—110 | ... | ... |
| 157,150 | ,, | Feb. 15 | 5 | 6½ | Chester 5 p.c. Ord. ... ... | 89—94[b] | ... | ... |
| 98,936 | 1 | May 23 | 2/- | 2/- | Colombo, Ltd. Ord.... ... | 26/—31/- | ... | ... |
| 24,500 | 1 | ,, | 1/4½ | 1/4½ | Do. 7 p.c. Pref. | 17/—19/- | ... | ... |
| 609,204 | 1 | Apl. 4 | -/10'90 | -/11'47 | Colonial Gas Assn. Ltd. Ord. | 10/—15/- | ... | ... |
| 296,053 | 1 | ,, | 1/2'54 | 1/3'30 | Do. 8 p.c. Pref. | 10/—15/- | ... | ... |
| 2,073,280 | Stk. | Feb. 15 | 6 | 5½ | Commercial Ord. ... ... | 100—110 | ... | 107—109½ |
| 475,000 | ,, | June 20 | 3 | 3 | Do. 3 p.c. Deb. ... | 70—75 | ... | ... |
| 807,560 | ,, | Feb. 15 | 7 | 7 | Croydon sliding scale ... | 132—142 | ... | 138 |
| 469,590 | ,, | ,, | 5 | 5 | Do. max. div. ... ... | 95—100 | +2½ | ... |
| 500,000 | ,, | July 4 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 110—120 | ... | 120 |
| 542,270 | ,, | Feb. 29 | 7 | 10 | Derby Con. ... ... ... | 117—122[c] | ... | ... |
| 55,000 | ,, | July 4 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 65—70[c] | ... | ... |
| 209,000 | ,, | Mar. 14 | 5 | 5 | East Hull Ord. 5 p.c. ... | 94—99 | +1½ | 96—98½ |
| 179,500 | ,, | Feb. 29 | 5½ | 5½ | East Surrey Ord. 5 p.c. ... | 105—115 | ... | 115 |
| 155,019 | ,, | June 20 | 5 | 5 | Do. 5 p.c. Deb. ... | 110—115 | ... | ... |
| 1,002,180 | ,, | Mar. 14 | 14 | 16½ | European, Ltd. ... ... | 95—105 | ... | 95—102 |
| 19,405,992 | ,, | Feb. 15 | 5⅝ | 5⅝ | Gas Light & Coke 4 p.c. Ord. | 23/—25/-[f] | +-/6 | 23/4½—24/3 |
| 2,600,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. max. ... ... | 79—84 | +1 | 81—82½ |
| 4,477,106 | ,, | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. ... | 96—101 | +1 | 98½—100 |
| 6,102,497 | ,, | June 20 | 3 | 3 | Do. 3 p.c. Con. Deb. ... | 75—80 | +2 | 77½—79 |
| 3,642,770 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 109—114 | ... | 112 |
| 2,500,000 | ,, | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Deb. ... | 105—110 | ... | 107—108 |
| 264,011 | ,, | — | — | — | Harrogate New Cons. ... | 106—111 | +1 | 109½—110 |
| 82,500 | ,, | Mar. 14 | 7 | 7 | Hastings & St. L. 5 p.c. Conv. | 120—130 | +12½ | ... |
| 258,740 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Conv. | 90—95 | ... | ... |
| 70,000 | 10 | June 6 | ‡5 | ‡10 | Hongkong & China, Ltd. ... | 10—11 | ... | ... |
| 213,200 | Stk. | Feb. 29 | 6 | 6 | Hornsey Con. 3½ p.c. ... | 105—110 | ... | ... |
| 5,600,000 | ,, | June 6 | 15 | 14 | Imperial Continental Cap. | 180—200 | ... | 188½—197 |
| 228,130 | ,, | Feb. 1 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. | 82—87 | +5 | ... |
| 235,242 | ,, | Mar. 14 | 8½ | 8½ | Lea Bridge 5 p.c. Ord. ... | 145—155 | ... | ... |
| 2,145,907 | ,, | Feb. 29 | 6 | 6 | Liverpool 5 p.c. Ord. ... | 111¼—113½[b] | +1 | ... |
| 245,500 | ,, | June 20 | 5 | 5 | Do. 5 p.c. Red. Pref. ... | 100—110[b] | ... | ... |
| 306,083 | ,, | Jan. 15 | 4 | 4 | Do. 4 p.c. Deb. ... | 87—92[b] | ... | ... |
| 165,736 | ,, | Feb. 15 | 8 | 10 | Maidstone 5 p.c. Cap. ... | 155—165 | ... | 160—160½ |
| 56,176 | ,, | June 20 | 3 | 3 | Do. 3 p.c. Deb. ... | 65—70 | ... | ... |
| 75,000 | 5 | June 20 | ‡10 | ‡10 | Malta & Mediterranean ... | 7½—8½ | ... | ... |
| 892,000 | — | Apl. 1 | 5½ | 5½ | Metropolitan (of Melbourne) 5½ p.c. Red. Deb. ... ... | 95—100 | ... | ... |
| 171,978 | Stk. | Feb. 29 | 5 | 5 | M. S. D. Utility "C." Cons. | 88—93 | ... | 90—91 |
| 718,657 | ,, | ,, | 4 | 4 | Do. 4 p.c. Cons. Pref. | 82—87 | ... | ... |
| 112,126 | ,, | July 4 | 4 | 4 | Do. 4 p.c. Deb. ... | 87—92 | ... | ... |
| 148,955 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 105—110 | ... | ... |
| 675,000 | ,, | 21 May '31 | ‡6 | ‡6 | Montevideo, Ltd. ... ... | 40—60 | ... | ... |
| 2,061,315 | ,, | Feb. 29 | 5 | 5½ | Newcastle & Gateshead Con. | 21/6—22/6[d]/ | +-/6 | ... |
| 682,856 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. ... | 91—92[d] | +1½ | ... |
| 691,705 | ,, | June 20 | 3½ | 3½ | Do. 3½ p.c. Deb. ... | 89—91[d] | +5 | ... |
| 277,285 | ,, | Apl. 29 | 5 | 5 | Do. 5 p.c. Deb. '43... | 105—110[d] | ... | ... |
| 274,000 | ,, | Feb. 15 | 5 | 5 | Newport (Mon.) 5 p.c. max. | 84—86[a] | ... | ... |
| 199,940 | ,, | Mar. 14 | 7½ | 7½ | North Middlesex 6 p.c. Con. | 135—145 | ... | 141½ |
| 396,160 | ,, | Feb. 15 | 5 | 5 | Northampton 5 p.c. max. ... | 90—100 | ... | ... |
| 300,000 | ,, | Apl. 18 | 9 | 7 | Oriental, Ltd. ... ... | 85—95 | ... | ... |
| 205,162 | ,, | June 20 | 8 | 8 | Plym'th & Stonehouse 5 p.c. | 140—150 | ... | 143—150 |
| 504,416 | ,, | Feb. 15 | 8 | 8 | Portsm'th Con. Stk. 4 p.c. Std. | 140—150 | ... | ... |
| 241,446 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... | 90—95 | ... | ... |
| 114,000 | ,, | Feb. 15 | 5 | 5 | Preston 5 p.c. Pref. ... ... | 102—107 | ... | ... |
| 686,312 | ,, | July 18 | 4 | 4 | Primitiva 4 p.c. Rd. Db. 1911 | 75—80* | −2 | ... |
| 389,813 | ,, | June 20 | 4 | 4 | Do. 4 p.c. Cons. Deb. | 76—81 | ... | ... |
| 150,000 | 10 | Apl. 4 | 6 | 6 | San Paulo 6 p.c. Pref. ... | 7—7½ | ... | ... |
| 1,736,968 | Stk. | Apl. 4 | 6 | 6 | Sheffield Cons. ... ... | 108—112[e] | ... | ... |
| 95,000 | ,, | July 18 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 90—94[e] | −2 | ... |
| 133,201 | ,, | Feb. 29 | 8½ | 5 | Shrewsbury 5 p.c. Ord. ... | 110—115 | ... | ... |
| 90,000 | 10 | June 6 | ‡5 | ‡5 | South African ... ... | 4—6 | ... | ... |
| 6,709,895 | Stk. | Feb. 15 | 5 | 7 | South Met. Ord. ... ... | 118—123 | +1 | 120—122 |
| 1,186,812 | ,, | ,, | 6 | 6 | Do. 6 p.c. Irred. Pf. | 125—135 | ... | 131—133 |
| 1,895,445 | ,, | July 4 | 3 | 3 | Do. 3 p.c. Deb. ... | 74—79 | ... | 76½—78 |
| 1,000,000 | ,, | July 18 | 4 | 5 | Do. 5 p.c. Red. Deb. | 108—115* | ... | 110—112½ |
| 91,500 | ,, | Feb. 29 | 8½ | 8½ | South Shields Con. ... ... | 129—131[d] | ... | ... |
| 1,548,795 | ,, | Feb. 15 | 6 | 6 | South Suburban Ord. 5 p.c. | 116—121 | +1½ | 118—120 |
| 300,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. | 109—114 | ... | 112—113 |
| 668,837 | ,, | June 20 | 5 | 5 | Do. 5 p.c. Deb. | 116—121 | ... | 117½—119½ |
| 647,740 | ,, | Feb. 29 | 5 | 5 | Southampt'n Ord. 5 p.c. max. | 90—95 | ... | ... |
| 121,275 | ,, | June 20 | 4 | 4 | Do. 4 p.c. Deb. | 90—95 | ... | ... |
| 200,000 | ,, | June 20 | 6½ | 6½ | Swansea 6½ p.c. Red. Deb. | 103—108 | ... | 106—108 |
| 1,076,490 | ,, | Feb. 29 | 6½ | 6½ | Tottenham and District Ord. | 122—132 | ... | 129—131 |
| 300,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Pref. ... | 113—118 | ... | 118 |
| 199,005 | ,, | June 20 | 4 | 4 | Do. 4 p.c. Deb. ... | 90—95 | ... | 93 |
| 85,701 | ,, | Apl. 4 | 6 | 6 | Tuscan, Ltd., 6 p.c. Red. Db. | 70—75 | ... | ... |
| 346,069 | ,, | Feb. 29 | 7 | 7 | Uxbridge, Maidenhead, & Wycombe 5 p.c. ... ... | 125—130 | +2½ | 127—130 |
| 88,330 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 100—105 | ... | ... |
| 1,322,220 | ,, | July 4 | 7 | 7 | Wandsworth Consolidated | 130—140 | ... | 135—137 |
| 971,373 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 109—114 | +1 | 112—113 |
| 1,167,964 | ,, | June 20 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 110—120 | ... | 117—119½ |
| 158,400 | ,, | Feb. 29 | 5 | £g | Winchester W. & G. 5 p.c. Con. | 100—105 | +10 | 105 |

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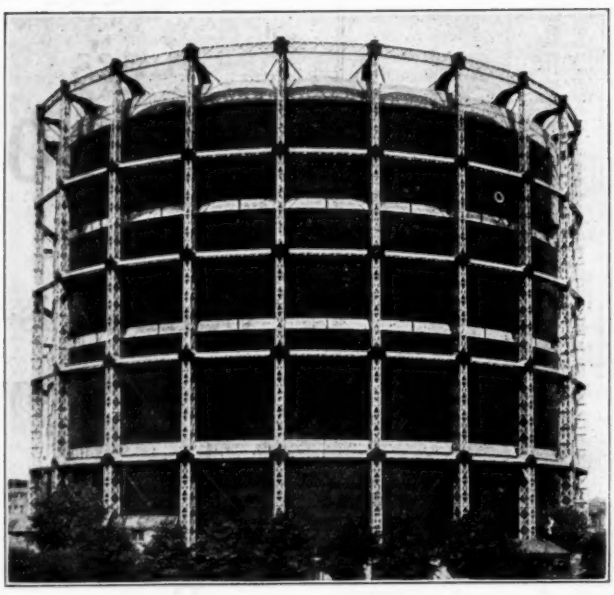

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